Mapping the contours of organic agriculture: an exploratory study of an under-served population in South Africa

by

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Declaration

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Summary

The aim of this study was to determine the challenges that organic producers face in South Africa and to determine how universities and other knowledge institutions might better support these producers. As a result, the objectives of this study is to answer four questions: how producers are divided in terms of biographical, geographical and production aspects, what the main sources of support and information are for producers, how universities and other knowledge institutions can best support organic agriculture in South Africa, and what the most significant challenges are that producers face.

Reliable data on the certified organic sector in South Africa remains lacking. In order to better understand the needs of this population, both quantitative and qualitative data was gathered. Because no other record keeping for organic producers in the country could be found in 2017, the contact details of 193 clients were obtained from third party certifiers. In-depth interviews were conducted with 27 participants from this population. Biographical data on participants as well as details about the farming operation were gathered using quantitative, structured questions. Qualitative data on the kind and quality of information and support services that participants have access to, the challenges that they face on-farm and in general, and the way that they overcame and adapted to these challenges were gathered using semi-structured questions. Quantitative data, such as age, ethnicity, gender, level of education and production data were used to describe the characteristics of participants. Likert-scale questions on possible sources of information were statistically analysed. Qualitative data were coded using Atlas.ti and analysed using aspects of contents analysis and grounded theory.

Participants were found to be mostly male, white, well-educated and the majority were between 30 and 49 years of age. Participants were mostly producing fruit (and mainly citrus for this category), as well as grapes (mainly wine-grapes), essential oils and pecans. In terms of potential avenues of support, government and extension services were rated lowest by participants in terms of frequency of access and usefulness of such services. Internet articles and journals, certifying companies, and other organic farmers were rated highest in terms of support offered. A lack of locally adapted research, applicable to South African organic farming systems was identified as a major constraint in participants' ability to make properly informed management decisions. Pest and disease management, a lack of informational resources and securing inputs were mentioned as main challenges during conversion. A small local market, along with a consumer base that is uninformed about the nature and benefits of organic products, were highlighted as off-farm constraints to success.

Understanding of the different paradigm that informs organic farming systems was listed as the most important factor to ensure success as an organic farmer. This paradigm involves focusing on building agro-ecosystem health to support the crop, understanding and adapting management to the unique

character of the local agro-ecosystem, knowing when not to intervene in the agro-ecosystem, and ensuring profitability by minimising input costs.

The development of informational resources on organic management for the South African context and the support of knowledge exchange were determined to be the most important recommended interventions to support the organic agriculture sector. These involve further research on the fundamentals of organic management strategies for the local context, the creation of a knowledge hub that collects and synthesizes available research and the facilitation and expansion of current knowledge exchange networks.

Opsomming

Die hoof doelwit van hierdie studie was om te bepaal watter uitdagings organiese produsente in Suid-Afrika ervaar, en hoe universiteite en ander navorsingsinstansies sulke produsente beter kan ondersteun. Gevolglik beoog hierdie studie om die volgende vrae te beantwoord: hoe produsente verdeel is in terme van biografiese, geografiese en produksie aspekte, wat die hoof bronne van inligting en ondersteuning is vir produsente , hoe universiteite en ander navorsingsinstansies organiese landbou in Suid-Afrika kan ondersteun, asook wat die grootste uitdagings is wat produsente ervaar.

Betroubare data oor die gesertifiseerde organiese sektor in Suid-Afrika skiet vêr te kort. Om die behoeftes van hierdie groepering beter te verstaan, was beide kwalitatiewe en kwantitatiewe data ingesamel. Omdat geen rekord van gesertifiseerde organiese produsente in 2017 gevind kon word nie, was die besonderhede van 193 kliënte verkry van derde-party sertifiseerders. In diepte onderhoude was met 27 respondente gevoer wat vanuit hierdie proefsteek geneem was. Biografiese data, sowel as data oor produksie was ingesamel via kwantitatiewe, gestruktureerde vrae. Kwalitatiewe data oor die tipe en kwaliteit van inligting- en ondersteuningsdienste wat respondente van gebruik gemaak het, die uitdagings wat respondente ervaar, sowel as hoe hulle hierdie uitdagings aangespreek het, was ingesamel via semi-gestruktureerede vrae. Kwantitatiewe data, soos ouderdom, etnisiteit, geslag, vlak van opvoeding en produksie data was gebruik om respondente te beskryf. Likert-skaal vrae oor moontlike bronne van inligting was statisties geanaliseer. Kwalitatiewe data was gekodeer met behulp van die sagtewarepakket Atlas.ti en was geanaliseer deur aspekte van inhoud analise (“content analysis”) en gefundeerde teorie (“grounded theory”).

Respondente was oor die algemeen manlik, wit, het ‘n hoë vlak van opvoeding en die meerderheid was tussen 30 en 49 jaar oud. Die meerderheid van respondente het vrugte geproduseer (sitrus vrugte het die meerderheid van hierdie kategorie behels), sowel as druiwe (meestal wyndruiwe), vlugtige olies en pekanneute. In terme van bronne van inligting en ondersteuning, het die regering en landbou voorlegging die laagste rankorde behaal, beide in terme van hoe gereeld dit gebruik was en hoe bruikbaar die inligting was. Internet bronne en aanlyn wetenskaplike joernale, die sertifiserende maatskappy, sowel as ander organiese boere het die hoogste rangorde behaal.

‘n Tekort aan plaaslik-toepaslike navorsing, spesifiek binne die konteks van Suid-Afrikaanse organiese sisteme, was geïdentifiseer as ‘n noemenswaardige struikelblok vir respondente om ingeligte boerdery besluite te maak. Pes- en siektebeheer, genoegsame inligtingsbronne, en die opsporing van nuwe, organiese insette was genoem as die hoof uitdagings tydens die oorgangstydperk van konvensionele na organiese boerdery. ‘n Plaaslike mark wat nog klein is, sowel

as oningeligte verbruikers wat nie genoegsaam bewus is van die aard en voordele van organiese produksie, was genoem as die hoof eksterne uitdagings vir die organiese sektor.

Om die nuwe paradigma van organiese boerdery te verstaan was genoem as die hoof aspek om sukses as ‘n organiese boer te verseker. Hierdie paradigma verskuif die fokus na die ekosisteem, wat opgebou word om die gewas te ondersteun. Die verstaan van en aanpassing by die unieke karakter van die plaaslike ekosisteem is dus belangrik. Hierdie paradigma behels ook die vermindering van inset kostes, om sodoende winsgewend te bly.

Die ontwikkeling van inligtingsbronne oor die bestuur van organiese produksie wat spesifiek aangepas is vir die Suid-Afrikaanse konteks, sowel as beter ondersteuning van reeds-bestaande geleenthede vir kennis deel, was bepaal as die belangrikste twee faktore vir die sukses van die organiese sektor. Dit behels, onder andere, basiese navorsing oor bestuurspraktyke wat aangepas is vir die plaaslike konteks, die skepping van ‘n databasis wat bestaande navorsing oor organiese praktyke versamel, en die uitbreiding en ondersteuning van bestaande kennis netwerke.

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Chapter 1: Introduction

1.1 A systems approach to agriculture and agricultural research

Farming systems research brings the systems thinking approach to research in agriculture (Darnhofer et al., 2012). Within this framework agriculture is viewed as a socio-ecological system (both a natural and a social system). Research on agricultural systems is thus concerned with the biotic and abiotic interactions within the agro-ecosystem itself, the social system of human actors, the different values and discourses of society, as well as how these two systems interact (Alrøe, 2000).

Within the farming systems framework, agricultural research is also seen as part of this socio-ecological system, as such research plays an important part in shaping its subject area (Alrøe & Kristensen, 2001). Thus, due to the high level of influence such research can have, the value judgements inherent in deciding what is researched need close examination. For example, Vanloqueren and Baret (2017) compared the research trajectories that genetic engineering and agro-ecology have taken. They found that scientists perceived genetic engineering as a 'breakthrough' technology that provided 'total' solutions to problems; agro-ecology, by contrast, was seen as only providing 'incremental' innovations and could only partially solve the presented problems. Despite ample evidence that none of these perceptions were accurate, research over the previous decades clearly favoured the one technology over the other. This serves to illustrate the fact that the choice of subject matter within scientific research remains a value-driven undertaking and in the case of agricultural research can serve to determine the trajectory that agricultural development takes (Alrøe & Kristensen, 2001).

1.2 Defining sustainable agriculture and the paradigm of sustainability

The term 'sustainable' has become ubiquitous in agricultural literature, but the term has been used so often and in so many contexts that it has taken on a variety of meanings that, in certain cases, can contradict one another. Thus, any engagement with this concept requires a firm grounding in a specific understanding of the term.

Within agricultural systems, the term 'sustainable' can often reveal a paradigmatic dichotomy in the way that it is understood. These two paradigms can be called the conventional and alternative agricultural paradigms, and sustainability is defined in markedly different ways within them (Beus & Dunlap, 1990). For the purposes of this document, conventional agriculture is defined as a system of agriculture that is input intensive and utilizes artificial fertilizers, chemical pesticides and herbicides, and employs low crop diversifications (monocultures) (Knorr & Watkins, 1984; cited in

Beus & Dunlap, 1990). Alternative agriculture refers to multiple different systems, such as organic, biodynamic, agro-ecology, etc., which have all come into existence as alternatives to the predominant system of production. Though different, they do share broad philosophical underpinnings, such as care for nature (Beus & Dunlap, 1990).

Smit and Smithers (1993) define three different aspects of agricultural sustainability. The first is that of food sufficiency or the ability of agriculture to meet the demand for food, fuel and fibre. The second is that of environmental stewardship or the preservation of both the productive capacity of farmland and the ecological integrity of surrounding ecosystems. The third aspect is that of economic and social considerations, or the ability of agriculture to provide economically viable enterprises, maintain rural communities and equitably distribute the goods produced by agriculture.

The dominant paradigm of conventional agriculture can thus be seen as primarily defining sustainability as the first aspect, as well as the economic aspects of the third aspect. Thus, maximising yield, improving efficiency and protecting the crop (and thus yield) through chemical measures are all part of sustainable agricultural practice within this paradigm.

The alternative agricultural paradigm would primarily define sustainability as the second aspect, as well as the social components of the third aspect (Smit & Smithers, 1993). Thus, minimising the impact on the surrounding ecosystems and ensuring healthy and viable rural communities would form part of sustainability within this paradigm.

Tittonell (2014) provides an alternative classification for agricultural systems, that of a spectrum of environmental sustainability, and situates various farming systems along this spectrum. The current agricultural system dominant in the industrialized world (conventional agriculture) primarily approaches sustainability in terms of resource optimization or 'eco-efficiency', which ranks at the lowest end of Tittonell's spectrum of sustainability. Mid-tier systems substitute inputs for those with a lower impact on the environment, such as organic agriculture. At the other end of the spectrum is the total redesign of agro-ecological landscapes and the food system in general, thus taking the concept of sustainability beyond the farm level, and extending it to the landscape and societal scale.

In terms of the positioning of this work, sustainability is defined within the paradigm of alternative agriculture, and thus the primary focus is on environmental sustainability. Sustainability is also a relative term and farming systems are thus situated on a spectrum of sustainability. Organic agriculture is thus not defined as the epitome of sustainability, but is seen as one stage of development along a trajectory towards more sustainable farming systems.

1.3 Organic agriculture as a system of sustainable agriculture

According to the Codex Alimentarius Commission (2013), organic agriculture can be defined in broad terms as:

> "…*a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs*…"

Specifically, synthetic inputs such as chemical fertilizer and most pesticides (those based on chemical synthesis), as well as any genetically modified organism are not allowed in organic production systems (Scialabba & Müller-Lindenlauf, 2010).

As mentioned in the quote above, organic systems emphasize management practices in order to solve on-farm challenges, instead of using off-farm inputs such as pesticides. In the absence of the convenience of chemical fertilisation and crop protection, organic management demands the integration of many practices in order to reach management objectives. These practices include, among others, habitat management, use of biological control agents, crop rotations, compost and manure application, mechanical weed control, mulching, green manures and catch cropping (Codex Alimentarius Commission, 2013; Pimentel et al. , 2005).

Because organic production systems have specific practices that set them apart from most conventional agricultural systems, there have been attempts to codify organic management into a set of standards. One of the first standards to be developed was those of IFOAM (International Federation of Organic Agriculture Movements), an umbrella organization that advises the organic industry on an international level. Many national and local standards across the world are either based on or approved by IFOAM as aligning with their standards (Milestad, 2003) , including the South African Organic Standard, which was included in the IFOAM Family of Standards in 2017 (SAOSO, 2017).

To ensure compliance with these standards, organic farmers must be audited once a year by an independent third party certifying company that will issue a certificate of compliance to the applicable organic standard of the region or country (Lohr, 2016). This certification is most commonly required when long food value chains separate producers and consumers, as is the case with most supermarkets, where consumers require an assurance that a product adheres to the standards under which it is being sold (Codex Alimentarius Commission, 2013).

While the principles of organic farming are followed by many farmers across the world, only some of these farmers are certified as such. While it is difficult to determine how many farmers follow organic principles, the latest report by IFOAM places the number of certified organic farmers at 2.7 million worldwide, who occupy 1.2% of total agricultural land (Willer & Lernoud, 2018). Certified farmers

most often utilize formal markets such as supermarkets, while non-certified farmers most often utilize informal markets such as farmers' markets or direct marketing such as sales at the farm gate. Non-certified farmers often have direct contact with consumers, which ensures that trust is built in the adherence to the principles of organic agriculture, even with a lack of formal certification. This first-party means of quality management is known as "self-claim".

Organic certification has been criticised as being too expensive and excluding poor and emerging farmers (Thamaga-Chitja & Hendriks, 2008). One way that expensive certification has been addressed is through an alternative quality assurance scheme called Participatory Guarantee System (PGS) in which a group of farmers producing together set up a system of internal controls to ensure compliance with organic principles. This is done in a transparent manner so that consumers are able to determine to what extent such principles adhere to their own requirements (Luttikholt, 2007). This is a second-party quality assurance system. PGS has already shown promising results in improving the livelihood of small scale producers in certain parts of South Africa (Auerbach, 2018a).

Thus, the organic agricultural system includes farmers following a set of principles or standards by which they are circumscribed to conduct their farming practices. A subset of these farmers is certified according to these principles. Some are certified by a third party (certification body) to ensure compliance with specific regional or nationally determined organic standards and some are quality assured using the PGS system of internally determined standards based on organic principles.

1.4 Background and problem statement

Organic agriculture, while comprising only a small portion of total agriculture in South Africa, is a highly diverse sector. Crops commonly produced include indigenous teas, vegetables, fruit, wine and table grapes (INR, 2008). A small number of producers also raise organic livestock (INR, 2008).

Recent reports, however, show a declining number of producers. Producers were estimated to number 297 in 2008, but had fallen to 196 in 2018 (INR, 2008; Willer & Lernoud, 2018). Organic agriculture is a sector in South Africa that remains under-served, both in terms of support services and in terms of research. Such support services are ideally built upon a strong basis of information on the nature of the challenges that the sector faces within the local context. While past research has attempted to identify such challenges, this research is outdated and can no longer be relied on to show an accurate picture of the sector (INR, 2008; Niemeyer & Lombard, 2003).

1.5 Research aim and objectives

This study is exploratory in nature and aims to discover the needs of an under-served portion of the farming sector in South Africa. One aim of this study was the collection and analysis of baseline information about organic production in South Africa. This includes information on types of production and other demographic categories, such as age, gender and level of education. The primary aims of this study, however, was to determine the challenges faced by organic producers and the possible role that knowledge institutions might play in order to overcome those challenges.

The objective of this study is to answer the following questions:

1. What is the typology of organic producers in South Africa (how are these producers divided in terms of demographics, geographic distribution and production size and type?)
2. What are the main sources of support and information for these producers?
3. How can universities and other knowledge institutions best serve organic farmers?
4. What are some of the challenges faced by organic producers in South Africa?

1.6 Thesis outline

Following on from this introductory chapter (Chapter 1), the next chapter (Chapter 2) deals with a review of the literature, and provides insight on the state of organic agricultural research in South Africa up to this point. It also explores the contribution that organic agriculture can make towards environmental and social objectives, as well as climate change mitigation and adaptation.

Chapter 3 explains the methods used in the execution of this study, how data was gathered, what hurdles were faced during this process, what ethical aspects were taken into consideration and how data were analysed.

Chapter 4 highlights the most prominent findings from the study and Chapter 5 discusses those findings in more detail. Chapter 5 also contextualises these findings within the broader literature.

Finally, Chapter 6 makes recommendations based on the previous two chapters and explores possible avenues for further study, as well as suggested key interventions based on the findings of this study.

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Chapter 2: Literature review

2.1 Introduction

The purpose of this chapter is to contextualise the research findings found in the following chapters. Section 2.2 details the history of organic agriculture in South Africa and how the current data on this sector is fragmented and, in certain cases, how its quality cannot be verified. This section also details some of the findings from past studies that also investigated challenges that organic farmers faced in South Africa, although such research focused primarily on the process of conversion from conventional to organic management or only on small scale emerging farmers. Section 2.3 shows that farming systems should not only be quantified according to yield, but can offer many other benefits that may not be taken into consideration when valuing those systems. These benefits include environmental benefits (2.3.1), social benefits (2.3.2) as well as benefit to climate change adaptation and mitigation (2.3.3). Lastly, section 2.4 explores alternative approaches to research, learning and knowledge transfer within sustainable farming systems.

2.2 The history of organic agriculture in South Africa

The organic agricultural movement has its roots in a community of diverse organisations from around the world that shared a philosophy of caring for the earth and soil, and wanting to mimic nature in agricultural practice (Geier, 2007). As an entity, the organic movement formalised its existence in 1972, when IFOAM was formed by a core group of people from these organisations. South Africa played a key role in the formation of this international federation. The Soil Association of South Africa was one of only five organizations that came together in Versailles on the fifth of November 1972 to form IFOAM.

Despite playing such a key role in the formation of one of the most prominent organic organizations in the world, South Africa has never managed to truly grow beyond this promising start. According to the latest IFOAM report, South Africa ranks 77th out of 166 countries on the total amount of certified organic land (Willer & Lernoud, 2018). In contrast, South Africa was ranked 12th for total agricultural land (includes arable as well as grazing land) in 2015 by the Food And Agriculture Organization (FAO) (FAO, 2015a). Given the static nature of arable land, this figure is unlikely to have changed much between 2015 and 2018. This serves to illustrate how low the proportion of certified land in South Africa currently is.

Despite its strong geopolitical position on the African continent, and despite having access to the largest amount of agricultural land in Africa (includes arable as well as grazing land), South Africa does not feature as prominently as may be expected with regard to organic agriculture (FAO, 2015b).

In terms of total land certified for organic production on the African continent, South Africa falls below the top ten countries, preceded by the more resource-poor Uganda, Tanzania and Ethiopia which occupy the top three positions. In terms of total number of producers it also does not feature in the top ten, with Uganda, Tanzania and Ethiopia once again occupying the top three positions in Africa. South Africa also does not make the top ten for proportion of organic land versus conventional production, the proportion of organic land being listed as 0.01% of total land under production (Willer & Lernoud, 2018). This poor performance stands in contrast to the rapid and sustained growth of organic markets over the past twenty years worldwide.

The second problem is the reporting of the statistics mentioned above. According to Kelly and Metelerkamp (2015) there are challenges with data reliability with the reporting of statistics regarding the South African organic industry. The foremost source of data on organic agricultural production comes from IFOAM itself; it publishes a yearly report on the organic industry from around the world in collaboration with FiBL (Research Institute of Organic Agriculture). The IFOAM report of 2018 lists the number of certified farmers in South Africa as 196 (Willer & Lernoud, 2018). Since 2014 this report includes the list of organizations from which the data was collected. Looking at the sources for South Africa it becomes apparent that the data cannot be used to accurately report the state of organic agriculture in the country. Because the South African government does not collect any information on organic farmers, FiBL and IFOAM must rely on self-reporting from third party certifiers. Reports by FiBL for the last three years show a differing composition of certifiers each year (Willer & Lernoud, 2016, 2017, 2018). Moreover, none of the above mentioned reports includes CERES (CERtification of Environmental Standards), for example, which also certifies farmers in South Africa. Besides these studies, few other researchers have tried to quantify the organic sector in South Africa in its entirety, specifically how many farmers are currently certified (Kelly & Metelerkamp, 2015).

The few studies that have attempted to quantify the organic sector in South Africa are summarized below in Table 2.1. It is clear that not many reliable conclusions can be made about organic agriculture in South Africa. It is also difficult to ascertain the number of producers currently certified in South Africa. This is problematic as accurate and reliable data on producers forms the basis of agricultural support. Without knowing basic statistics about organic producers, government, NGO's and research institutions cannot properly serve this part of the agricultural sector.

Table 2.1: Data sources and reliability of studies reporting on quantification of organic production in South Africa.

Variable	Statistic	Data source	Citation	Reliability
Number of organic producers	150	Unknown	(Moffet, 2001; cited in Niemeyer & Lombard, 2003)	Low. Study unpublished and unavailable
	240	Survey. Lists obtained from 6 certifiers	(Rundgren & Lustig, 2002)	Moderate to high. Lists obtained directly form certifiers
	279	Survey. Lists obtained from 9 certifiers (excludes two companies who refused to share any data)	(INR, 2008)	Moderate. Lists obtained directly form certifiers. Certain certifiers did not share data
	196	Self-reported by certifiers	(Willer & Lernoud, 2018)	Moderate. Figures obtained directly form certifiers, but excludes certain certifiers
Proportion of land under organic production (including pasture and under conversion)	43 620 ha	Survey. Lists obtained from 6 certifiers	(Rundgren & Lustig, 2002)	Moderate to high. Lists obtained directly form certifiers
	771122 ha	Unknown. Lists 'internet sources'	(Robertson, 2003)	Low. Source of data cannot be determined
	14 196 ha	Self-reported by certifiers	(Willer & Lernoud, 2018)	Moderate. Figures obtained directly form certifiers, but excludes certain certifiers

Past studies have also attempted to identify some of the challenges faced by organic producers. The Institute of Natural Resources (INR) report identified an unfavourable policy environment as one of the main threats to organic production in South Africa (INR, 2008). Currently, South Africa has no national legislation for organic production, hampering co-ordination efforts in the sector, as there are multiple groups and organizations all working with different standards and conceptions of what

constitutes organic agriculture (INR, 2008). As mentioned in Chapter 1, the South African Organic Sector Organisation (SAOSO) has produced a set of standards that has been accepted by IFOAM in 2017, but at time of writing has not been adopted by government or third-party certifiers (SAOSO, 2017).

This unfavourable environment is further exacerbated by the lack of knowledge of organic practices within government itself, which sees industrial agriculture as the only strategy for improving food security (Kelly & Metelerkamp, 2015). Thus, research and extension are all focused on implementing this type of agriculture across the country; with small scale farmers receiving free GMO seed and chemical fertilizers as part of this program (Landman, 2015).

Waarts et al. (2009) observed that the lack of central coordination and lack of government interest was also stifling export. Furthermore, the low volumes of products such as vegetables that were being produced was also hampering trade, as larger volumes were necessary to satisfy demand in European countries (Waarts et al., 2009).

Many studies identified the lack of sufficient training, information and research into organic production methods as a major constraint to the sector (Auerbach, 2018b; Hendriks & Lyne, 2009; INR, 2008; Landman, 2015; Thamaga-Chitja & Hendriks, 2008). Farmers have little opportunity to receive training on South African production practices (the lack of legislation also hampers the production of such training as there are no official agreements on the nature of such practices) (Hendriks & Lyne, 2009). A search of grey literature reveals that at least two organisations do offer training that is accredited by the South African Qualifications Authority, one in the Western Cape (Sustainability Institute, 2018) and the other in KwaZulu-Natal (Rainman Landcare Foundation, 2008).

Research institutions and universities are also underrepresented in the organic sector, both in terms of doing research and in disseminating that information to the sector and offering advice and support about production practices (Niemeyer & Lombard, 2003). This is problematic, as organic agriculture has the potential to provide many environmental and social goods (Auerbach, 2018b).

2.3 Yield and other ecosystem services

As briefly outlined in Chapter 1, this paper frames organic agriculture as its own particular farming system. One of the most common critiques levelled at organic farming systems is that they produce lower yields than conventional farming systems. Many comparative studies have found yield gaps between organic and conventional systems (Pimentel et al., 2005; Ponti et al., 2012; Reganold & Wachter, 2016; Seufert et al., 2012). These gaps range from 0% to 35%, with variability found between different crops, soils and climatic regions.

One such comparative trial is underway in South Africa. Initial results have shown a yield gap between conventional and organic plots to be 20% lower for cabbage and 24% lower for cowpeas (Mashele & Auerbach, 2016). However, this is a long term trial and final results are still forthcoming. Results show a closing of this yield gap after three years, once phosphate deficiencies were adressed (Auerbach, 2018a).

As part of a systemic method of inquiry, however, all aspects of farming systems need to be considered. Thus, in order to evaluate the merit of organic agriculture, a more holistic set of factors needs to be taken into account. According to Robertson et al. (2014) farming systems need to be valued for the potential ecosystem services that they can provide. Yield is simply one service provided by farming systems and is often the only one that is considered. Clean water, higher biodiversity, pest control, recreational use and aesthetic rural landscapes are all potential services provided by agricultural systems. Such services are currently externalities, but should be valued as essential services provided by sustainable farming systems (Robertson et al., 2014). The merits of organic systems should therefore also be measured by the potential ecosystem services and social benefits that they can provide.

2.3.1 Organic farming as a means to improve sustainability objectives

Many countries have made environmental sustainability a priority. Agreements such as the Sustainable Development Goals (SDG's) and the more recent Paris Agreement, mandate that signatories mitigate their impact on the environment (Griggs et al., 2013; Schleussner et al., 2016). As a result, finding more sustainable ways of food production has become a priority in many countries. South African agriculture, however, is still characterized by many destructive practices and is having adverse effects across multiple categories of measurement, including loss of soil organic carbon (Lobe et al., 2001; Swanepoel at al., 2016), pesticide runoff in rivers (Dabrowski et al., 2002; Schulz at al., 2002), high nutrient loading in freshwater systems (De Villiers & Thiart, 2007; Van Ginkel, 2011), as well as contributing to climate change (Van der Laan et al., 2017) .

Van der Laan et al. (2017) suggested possible avenues for addressing the discussed impacts by South African agricultural systems. Organic agriculture is not mentioned as one alternative to address these problems, even in the categories such as pesticide runoff. This seems counter-intuitive, as organic management employs a plethora of pest control strategies that do not require chemical intervention. This is perhaps an indication of how badly accounted for sustainable agricultural strategies are in the South African academic environment. From the international literature, however, it is clear that organic agriculture and the associated management strategies that it employs have a high potential for addressing many of the problems discussed above.

In terms of soil organic carbon (SOC), studies comparing organic and conventional fields have found statistically significant higher levels under organic management (Gattinger et al., 2012; Mondelaers et al., 2009; Pimentel et al., 2005). Higher SOC concentrations are attributed to a difference in management practices, mainly the addition of stable organic matter in the form of manure and compost, as well as the use of more diverse cropping systems, crop rotations and the addition of crop residues and green manure residues (Mondelaers et al., 2009).

Higher soil carbon is also associated with a host of positive soil properties, including better soil structure and water holding capacity (Van der Laan et al., 2015). This is thought to explain why organic systems perform better during years of drought stress compared to conventional systems, with 34% higher yield reported in one study (Gomiero at al., 2011; Pimentel et al., 2005). In a drought-prone country such as South Africa, this could represent an effective way of improving the resilience of farm systems against drought conditions.

In terms of pesticide use, organic farming provides the clearest benefits. Certified organic farmers are prohibited from applying any pesticide of synthetic origin. Organic farmers are, however, allowed the application of certain substances, according to EU organic regulations if it is "… of plant, animal, microbial or mineral origin except where products or substances from such sources are not available in sufficient quantities or qualities or if alternatives are not available" (The Council of the European Union, 2007). This means that certain pesticides are used, though they have to be certified as organic and from a list of pre-approved substances with a lower environmental impact. Compared to conventional systems, pesticide use can be as low as 3% of conventional levels in organic systems (Mäder et al., 2002). This is due to the fact that organic farmers mainly utilize management strategies (such as crop rotations), instead of inputs such as pesticides, to manage pest and disease levels (Codex Alimentarius Commission, 2013).

Lower pesticide use is also one of the factors responsible for the higher biodiversity reported for organic farms (Hole et al., 2005; Mäder et al., 2002). A meta-analysis of 30 years of published data on biodiversity comparisons showed a consistent 30% higher biodiversity in organic fields, compared with conventional (Tuck et al., 2014). It should also be noted that studies showed a clear bias towards Western and Northern Europe, as well as North America. In terms of functional and taxonomic groups, clearest increases in species richness were found for plants, birds, arthropods in general (and were particularly high for pollinators), as well as for microbes (Tuck et al., 2014).

Local studies are limited in scope, but two studies have analysed the pollinator and surface arthropod diversity in South African vineyards located in the Cape Floristic Region (Gaigher & Samways, 2010; Kehinde & Samways, 2012). Both studies found that the conservation of nearby habitat resulted in the conservation of the highest diversity of both of these groups. However, organic vineyards were found to contain higher species richness and abundance of monkey beetles (an important endemic pollinator and indicator species of disturbance), but not endemic bee species (Kehinde & Samways,

2012). On the field scale organic vineyards also support more surface arthropod diversity, though this effect was less significant at the landscape scale (Gaigher & Samways, 2010).

In terms of nutrient runoff, the evidence is less decisive. While Kramer et al. (2006) found nitrate leaching of organic apple orchards to be 4.4-5.6 times lower, Stolze et al. (2000) found lower leaching only in 59% of observed cases for field crops surveyed in Germany and Denmark. Mondelaers et al. (2009) also found significantly lower rates of nitrate leaching across various studies, though this difference was no longer significant if calculated on a per kilogram basis of crop produced. The lower yields of organic farming meant that similar amounts of crops were being produced for the same amount of nitrate leaching that takes place. Leaching is more influenced by individual management practices on the farm level, thus practices like ploughing leguminous cover crops at the wrong time or planting crops with low nitrogen requirements following high nitrogen input are practices in organic farming that could result in higher rates of nitrate leaching (Stolze et al., 2000).

2.3.2 Organic farming as a means to achieve social objectives

Many developing countries have not been able to benefit from more conventional models of agricultural development such as chemical fertilizer inputs and new high yielding seed varieties. This is partly due to degraded soils that are unsuitable for such modes of farming, and partly because the capital required to successfully convert to this mode of farming lies beyond the reach of the poorest in these nations or further traps them in cycles of poverty (Altieri & Masera, 1993; Eisses & Chaikam, 1961; Lal, 2005).

Sustainable agriculture provides one alternative development strategy that has been proven to offer benefits to those living with food insecurity and poverty. A survey of sustainable agricultural development projects in developing countries by Pretty et al. (2003) surveyed 208 development projects, with a combined connection to 8.98 million farmers who have adopted more sustainable agricultural practices. They found on average a 93% increase in per hectare food production using methods such as low technology water harvesting, soil management using cover crops, legume rotations, green manures, animal manure and compost, and pest and disease control using intercropping, crop rotations and integrated pest management (Pretty et al., 2003). This study demonstrates the many benefits already realized by implementing the strategies of sustainable farming, all of which also form part of organic management. A study by Lal (2005) also found that increasing the soil organic matter through better soil management strategies in developing countries can further improve yields and therefor food security.

Organic agriculture also presents opportunities for job creation and economic improvement (Kelly and Metelerkamp, 2015). According to Kelly and Metelerkamp (2015) organic farming can be a viable

way for black commercial smallholder farmers in South Africa to improve their farm viability and earn better livelihoods, particularly through access to premium local and international markets. Such farmers are particularly suited to organics because it is closer to traditional farming methods, saves money over time as inputs are minimised and conversion may be shorter in areas not previously farmed intensively (Kelly & Metelerkamp, 2015; Thamaga-Chitja & Hendriks, 2008). There are, however, several constraints that are currently limiting this potential. A lack of access to land and capital, problems with accessing local and international markets, high cost of international certification, lack of technical skills in organic farming and lack of extension are all barriers to success (Thamaga-Chitja & Hendriks, 2008).

An increase in organic agriculture is also likely to result in an increase in labour demand. Because chemical control is not an option, organic farmers often substitute with mechanical control strategies, which require a higher labour input. One study found labour requirements to be 20% higher for European organic farms (Häring et al., 2001). With an unemployment rate in South Africa of 27%, any increase in job creation is positive (StatsSA, 2018).

Agri-tourism represents another positive convergence between organic agriculture and rural development. This form of tourism is defined as any tourist or leisure activity that happens on a working farm and is often aimed at education as well as leisure activities (Choo & Jamal, 2009). Organic agriculture is uniquely suited for agri-tourism, as it already encapsulates a philosophy of sustainability and ethical production that makes it attractive to potential tourists (Pugliese, 2001). Agri-tourism also allows for a higher income and a reduction of financial risk by allowing for a diversification of income streams (Kuo at al., 2006). Attracting tourists to the farm could open unique opportunities to sell farm products, both directly and through provisioning of farm activities such as catering for accommodation, restaurants and picnics. Activities such as bird watching, hiking and cycling can allow additional usage of natural habitats and the ecosystems services they provide. It also provides an opportunity to educate the public about the challenges and value of organic agriculture (Kuo et al., 2006). The potential of agri-tourism, however, has thus far been neglected in the local economic development debate of South Africa (Rogerson & Rogerson, 2014).

2.3.3 Organic farming as a means for climate change adaptation

Globally agriculture directly contributes 10-12% of greenhouse gas (GHG) emissions, with land clearing for agriculture contributing a further 12% (Scialabba & Müller-Lindenlauf, 2010). This figure only reflects direct impacts and does not include emissions from input manufacture. Southern Africa is also considered to be one of two main climate change hotspots where the effects of change will have an especially negative impact on agricultural production (Lobell et al., 2008). Adaptation strategies in this area are therefore essential to maintain food security.

Organic farming has the potential to contribute to climate change mitigation and adaptation strategies. As discussed above, organic farming has the potential to increase SOC concentrations in soil. This also represents an opportunity for carbon sequestration. Modelling and direct observation of organic systems show promising potential to sequester carbon in the soil (Drinkwater et al., 1998; Foereid & Hoegh-Jensen, 2004). Using a perennial grass/clover mixture as well as cover crops were reported as significant factors responsible for this sequestration (Foereid & Hoegh-Jensen, 2004).

Artificial fertilizer production and transport also require a significant investment in (fossil fuel) energy, and avoidance of such synthetic fertilizers would mean a 20% reduction in GHG emissions for agriculture (Scialabba & Müller-Lindenlauf, 2010). In some cases this can be as high as 41%, as had been found for nitrogen application in South African sugar cane fields (Van der Laan et al., 2015). This represents significant reductions in the global warming potential of agriculture.

Mixed cropping systems, both in time and space, are another feature of organic farming systems and could help to buffer farmers from both climate and market shocks, more likely events in the face of climate change (Muller, 2009; Scialabba & Müller-Lindenlauf, 2010).

2.4 Research, learning and knowledge transfer for sustainable farming systems

Research and development (R&D) are critical factors necessary for the continuous improvement of agriculture in order to meet the needs of a growing population on a finite planet. Global expenditure on agricultural R&D has been estimated to be 49 million US dollars annually, and growing (Beintema et al., 2012). This investment is essential for ensuring that agricultural practices remain relevant in a constantly changing context. Organic agriculture, in contrast, has historically received very little R&D investment, and current estimates puts organic research at less than one percent of the global R&D budget (Niggli et al., 2016). Of the estimated 290 million US dollars spent annually on organic research, only 1.7% is spent on the African continent, further exacerbating the problem for African organic farmers (Niggli et al., 2016).

Learning and innovation within organic agriculture thus happened completely independently from traditional avenues of support. Such a system of innovation came about through farmer experimentation and without the support of either government or universities (Knickel et al., 2009). Farming methods were developed by innovating farmers and supported by forward-thinking consumers. Only after organic agriculture demonstrated market success did some governments implement supportive policies and some universities start conducting research on organic systems. Thus, farmer experimentation played a vital role in the creation and dissemination of new forms of knowledge (Knickel et al., 2009).

A greater awareness of the complexity of farming systems and the rural and urban landscapes they are embedded in, have also resulted in a re-evaluation of agricultural research, learning and support structures (Knickel et al., 2009). Many other factors such as rural development, conservation, natural resource management and ecosystem services provision now need to be taken into consideration (Knickel et al., 2009). Productive output can no longer be the only aim of agriculture. Furthermore, extension itself has also changed. According to Birner et al. (2009) extension services, which were once the sole domain of government, have now become a pluralistic enterprise with government, private companies and NGO's all contributing to the extension system. Within this system-oriented framework, linear models of knowledge transfer are no longer appropriate, thus new approaches to learning and knowledge production and transfer are required.

One useful way to reframe this relationship between support services and farmers is through the communities and networks of practice concept. Communities and networks of practice represent an analytical framework that describes the context in which many forms of formal and informal learning takes place (Oreszczyn et al., 2010). Communities of practice are simply groups of people who share a common identity because of activities or pursuits that they have in common. While they might not necessarily work together, there is some level of interaction between members of a community of practice (Oreszczyn et al., 2010). Networks of practice are similar to communities of practice as there is some form of shared identity and interaction, but the connections within that network are weaker and more diffuse than those of a community of practice (Brown & Duguid, 2001). At its core it is a reframing of the learning process, not as a passive, unidirectional flow from top to bottom, but as a dynamic social process. The implication is that sources of information can come from informal and unexpected places. Systemic research that aims to study farmer learning thus needs to take into consideration the many avenues for learning that exist or could exist.

According to Kummer et al. (2012) farmers can play a key role in generating and adapting knowledge about farming systems. They call for greater collaboration between researchers and extension agents, and farmers in order to co-produce knowledge that is closely aligned with the lived experience and needs of farmers. This necessitates more participatory and collaborative approaches. New approaches to extension should view knowledge creation as a social process, that happens as a result of interaction between stakeholders in a system (Darnhofer et al., 2012). The role of extension then becomes less that of knowledge transfer and more the facilitation of knowledge exchange. Farmers and other stakeholders are encouraged to self-direct learning in order to solve on-farm problems, with extension simply assisting and facilitating that process (Cristóvão et al., 2009). Through more participatory approaches it is ensured that the real needs of farmers and other rural stakeholders are addressed and that research and extension remain relevant and appropriate in addressing those needs. Given the many constraints on organic farming research, such as limited funding, producing highly relevant research in collaboration with stakeholders becomes even more important (Niggli et al., 2017).

2.5 Conclusion

From this chapter it is clear that many gaps in the research on organic agriculture in South Africa still exist. Previous studies on organic farming in South Africa have, however, identified many constraints to the success and expansion of this sector, such as the lack of support service available for organic farmers.

Lack of sufficient institutional representation has resulted in a lack of record keeping and as a result determining the exact number of organic producers in the country is difficult. However, it does appear that the number of producers has remained stagnant over the previous decades and may even have decreased.

Organic agriculture can contribute positively to many different development and environmental objectives. Existing research points to the potential contribution that organic systems can make to address specific challenges faced by agriculture in South Africa, such as the alleviation of water pollution and poverty. Taken as a whole, this chapter clearly demonstrates that further research on organic farming systems is required for the South African context.

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Chapter 3: Methodology

3.1 Introduction

In this chapter the reasoning and mechanisms used to assess the status of organic farming in South Africa are discussed in further detail. Section 3.2 explains the theoretical background of the approach to the research design and the way that specific philosophies informed the approach of the study as a whole. Section 3.3 offers an explanation of mixed methods approaches and why they were selected for this specific study. Details on the data collection instrument (3.4), selection criteria and recruitment methods (3.5), ethical considerations of the research (3.6), sampling procedure (3.7) and challenges faced during data collection are explained. Lastly, section 3.8 details the methods of analysis, including coding practices employed for the analysis of qualitative data, and statistical analyses of quantitative data.

3.2 Theoretical background

3.2.1 The pragmatic paradigm

The research paradigm of pragmatism is primarily concerned with solving problems and less concerned with abstract theory building. Pragmatic research aims for utility, rather than necessarily how accurately such research represents every facet of reality ('accuracy' in this sense refers more to how generalizable or universal research findings are, not how truthful they may be) (Feilzer, 2010). Similarly, the intention of this study is to address a specific knowledge gap that could potentially lead to actionable outcomes for the South African agricultural sector. The intended outcome of this research is first and foremost praxis, in other words putting theory into practice.

This pragmatic approach was used not only in the research aims, but also in the design of the study. Because the aim is utility, pragmatism embraces both quantitative and qualitative research methods (Onwuegbuzie & Leech, 2005). Combining quantitative and qualitative data in one study is commonly referred to as a 'mixed methods' approach. To what extent this study can truly be called 'mixed methods' is up for debate, as the quantitative and qualitative data are not completely integrated, nor do they truly inform one another outside of providing two aspects of the same picture. However, according to Brewer et al., (1989) mixed methods research falls on a spectrum, from single method research to fully integrated mixed methods research. Based on this observation, the methods used in this study also constitute a mixed methods design, even if not one on the extreme end of the spectrum.

3.3 Research design

The certified organic sector is largely unquantified and poorly recorded in South Africa (see Chapter 2). Without relevant data at comparable scales it is difficult to respond to the research needs of organic farmers. Information on how such farmers are distributed across the country, as well as how they compare to the general commercial farming population, was needed. This necessitated a quantitative approach to collecting data on individual organically certified farmers, and thus metrics that can be compared to similar cases in comparable datasets for commercial farmers, as well as taking into account previous studies that recorded the same metrics.

While quantitative measures can broadly situate certified organic farmers within the environment, they are limited in their ability to provide meaning to such data. Knowing what a farmer does in time and space, for instance, does not offer the rationale or the context for that particular practice. More qualitative approaches are required to answer the remaining research questions, especially when the focus is to facilitate action and to inform praxis. With the emphasis on praxis, this study has as its focus the lived experiences of organic farmers and the way that they interact with the wider world as well as with the knowledge and support structures within farming systems. Qualitative data are appropriate for this sort of research, as they allow for the capturing of a diverse body of experience as well as the meaning making that is associated with such experiences.

A previous study in which researchers engaged organic farmers in South Africa (Niemeyer & Lombard, 2003) used survey questions with predetermined categories for farmers to fill out. While surveys facilitate easy data capture and analysis, and make it possible to give clearly defined answers, they do not capture the potential complexity of the experiences that farmers may face (Kelley et al., 2003). Furthermore, Niemeyer and Lombard (2003) took a deductive approach to questionnaire construction. They based their category selection on previous studies from other countries in the absence of local studies on the subject. While this is a valid approach in the face of data scarcity, this limits the applicability of any findings, as it assumes that the specific problems that South African organic farmers face are sufficiently represented by these categories.

This study follows an inductive research approach. Instead of testing to what extent the data fits a pre-conceived theory or hypothesis, this approach allows for the research findings to emerge from the raw data without imposing pre-conceived theories onto the analysis (Thomas, 2006). As the study population has, as of yet, not been sufficiently researched, few explanatory theories can be constructed for this population. Thus an exploratory approach is first called for. With so many unknown factors it is important to capture as much of the complexity and variety within the study population as possible. For this reason, open-ended or semi-structured questions are more appropriate as the solicited responses give a voice to the farmers themselves and allow their lived experience to define the problems that they face.

3.4 Data collection instrument

A questionnaire comprising both structured (quantitative) and semi-structured (qualitative) questions was developed. (Appendix A). The instrument was divided into three sections, each reflecting the three main research aims: that of typology, that of knowledge networks and that of the challenges of formal commercial organic agriculture in South Africa.

The first section deals with the demographic information of the farmer as well as details on levels and diversity of production. The objective here was to be able to construct a profile of the farmers and to allow comparison with the general farming population. Though basic in nature, there was also an attempt to quantify the levels of farm productivity. Together with the geographic location of farms, this aimed to provide a general outline of the kinds of farmers that the study captured as well as what some of the main organic crops are that are being produced in the country. This part of the research seeks to form a typological description of farmers and farming systems in the commercial organic sector of South Africa.

The second section deals with access to information and the way that knowledge networks are constructed across sources, as well as between participants and other organic farmers. The questions in this section had both quantitative aspects and qualitative aspects. The quantitative analysis was in the form of a Likert-scale question where different sources of information had to be rated based on both frequency of access as well as usefulness of information. The qualitative exploration was in the form of semi-structured questions that dealt with participants' access to information, connections to other farmers and the role that universities and other research institutions could play in supporting organic agriculture in the country.

The last section deals with the challenges and successes that the farmers have faced over the span of their careers. It included semi-structured questions that attempt to capture the opinions and experiences of the participants. The aim of this section is to explore the different motivations for pursuing organic agriculture, some of the challenges that they have faced using this system of production, as well as some of the ways that they have adapted to these challenges.

3.5 Accessing and selecting participants

As mentioned in the literature review (Chapter 2), the exact number of organic producers is unknown in South Africa, as only third party certifying companies that certify farmers in South Africa have access to their own client lists. At time of writing there has been no regulatory body or umbrella organisation that keeps track of the number of organic producers in the country. In order to be able to contact farmers, access to the client lists of the certifying companies first had to be obtained.

In total there are seven different companies that certify organic farmers in the country (see Table 3.1 for more detail). From this list, three of the companies publicly display their client information. All clients that are certified for the National Organic Program (NOP) of the USA are also displayed on a central database that the United States Department of Agriculture (USDA) makes available online to the public (U.S. Department of Agriculture, 2017). Through the USDA database all client information from one certifier was captured. The remaining four certifiers were contacted, with only one of them refusing to provide access to their client lists.

Table 3.1: Certifying companies operating in South Africa.

Certifying company	Provided access?
Ecocert	Yes
BCS ÖKO-GARANTIE	No
CERES	Yes (Public)
Control Union	Yes
Lakon	Yes (Public)
Institute for Marketecology (IMO)	Yes (Public)
Quality Certification Services (QCS)	Yes

3.6 Ethical considerations

The contact information of the certified farms was obtained from third party certifiers. In most cases this information is in the public domain. Where special permissions were required, a letter explaining the purpose, aims, objectives and expected outcomes of the research was sent to the certifiers (Appendix B). One of the reasons that certification exists is so that consumers of these products have a guarantee that the product they are buying is made according to certain agreed upon standards. Because of this trust relationship that is necessary between consumer and certifier, many certifying agencies post their client lists publicly. However, some do not and it is these certifiers that need to be contacted directly.

All information received from certifiers was kept securely and only the main investigator had access to the data. In terms of participant data, no identifying information (name, address, contact information) was recorded on the interview sheet itself. Rather, each interview sheet was given a unique code (made up of the province that the farm is situated in, together with a number corresponding to the interview number, e.g. WC01) that corresponds to a separate list that can be used to link interviews with specific respondents. This sheet was also stored securely and only accessed by the main investigator. Identifying information and voice recordings were only stored for

a certain time and were deleted after the completion of the study. Interviews were conducted with institutional permission from the departmental ethics screening committee (DESC) of the relevant department and were classified as low risk (ethical clearance number: SU-HSD-004228).

3.7 Sampling procedure

Participants were selected based on the following criteria:

1. A participant is either the owner of the farm, main farmer or is the primary person who makes decisions about production practices on the farm (e.g. farm manager).
2. A farm is defined as any amount of land used to produce some kind of product of biological origin that is used as food, feed or fibre. This excludes wild-harvested products.
3. Primary production happens within the borders of South Africa.
4. The farm or farming operation is officially certified by a third party certifier as either organic or in conversion to organic (thus excluding PGS and self-claim producers).

The client lists that were obtained from certifying organisations had a mix of producers as well as processors that were certified as organic by their respective companies. Often it was impossible to tell whether a client was a producer or a processor. To further complicate matters, certain processors had their own producers that were all certified under the processors' name, making contacting these producers more complicated and time consuming, as there was no contact information for such farmers in the database, in these instances.

As this study focused exclusively on organic producers, processors were excluded. The contacting process was twofold: first an email detailing the study was sent to all producers on the list. Next, where available, participants were contacted telephonically. From both these methods, if there was a positive response, an appointment for an interview was set up.

As the study population was situated across the entire country, face-to-face interviews could only be conducted for participants within a certain radius of Stellenbosch University. For participants in remote locations, either Skype calls (only voice calls) or cell phone calls were used to conduct the interviews. In all cases some form of voice recording was used. A voice-recording device was used for face-to-face interviews, MP3 Skype Recorder (Domit LTD, 2017) was used for Skype calls and Boldbeast (a smartphone app) (Boldbeast Software Inc., 2017) was used to record cellular calls.

Out of 193 clients gathered from the different lists a total of 27 resulted in completed interviews. This represents a response rate of 14%, however, true response rate is difficult to calculate, as producer and processor client information was presented as one list and was difficult to differentiate (see Section 3.7 below).

3.8 Challenges with data collection

Similar to previous studies where researchers tried to contact organic farmers in South Africa, this study presented several challenges. As there is no central authority, governmental or otherwise, that co-ordinates organic agriculture in the country, no central record exists of all organic producers in the country. The only records that exist are those to be found with the third-party certifying bodies that audit and certify the farms on a yearly basis. These companies are for-profit and are all based in other countries, most often in Europe. This means that local offices are limited in their decision-making capacity with regard to the sharing of data, and are also often reluctant to disclose client information, as it is seen as confidential information that could affect their competitive ability with other certifying companies. The one company that did not give access to their client lists cited both of these factors as reasons for not giving out client information.

The second challenge was the fact that the client information given was often unclear, sometimes with only a name and an email address provided. As mentioned above, client lists contained a mix of both processors and producer client information. Distinguishing between the two was impossible in certain cases, as there was not enough explanatory information to do so. This was further complicated by the fact that certain processing companies had producers that were supplying goods and services to them exclusively, in which case the processing company then certified them under their own name.

These challenges were addressed by simply sending requests to all clients available, stipulating that only producers were to be included. In cases where processors had access to their own producers, requests were made to them to provide contact details for the producers. In certain cases these were provided, while some companies also refused to provide access.

It should also be noted that because the client lists that the population was drawn from were not complete, sampling cannot be seen as truly randomised, as the missing client information could be excluding a specific group of farmers (for example, farmers of a certain region could all be certified by the certifier not included in this study, thereby skewing information on the geographical distribution of organic farmers). The conclusions made in this study are therefore not representative of the general population, nor do they try to be. The aim of this research is to provide insight into the experiences of some organic farmers in South Africa and to help guide future research efforts on this subject that may wish to utilize more quantitative and statistically representative methods.

3.9 Data coding and analysis

Because the data collected consists of both quantitative and qualitative data, different approaches to analysis are also required.

The quantitative data consists of a set of structured questions that are primarily biographical in nature, as well as two Likert-scale type questions. In terms of statistical analysis, only the Likert-scale questions could be analysed, as the remaining quantitative data were primarily used descriptively. For the Likert-scale questions a mixed model Analysis of Variance (ANOVA) was used (with participants as random effect and source of information as fixed effect). Post hoc testing was done using Fisher LSD (Least Significant Difference). This analysis was done using Statistica 13.5.

The qualitative aspect included a series of semi-structured interview questions. The responses to these questions were recorded and transcribed into written format. Analysis of this data was conducted using Atlas.ti version 7.5.7. This is primarily done using the practice of content analysis as well as elements of grounded theory. Coding practice involved coding of sentence fragments and was done on two levels: by coding for specific questions and by coding for anything relating to the overall objectives of the study.

Specific questions were asked during the interview process (Appendix A). Once the interviews were transcribed, focused coding was used to find specific responses to the questions, which were coded with a categorical code to indicate the question that was answered and with a sub-code that indicated what specific response was given to that question (Saldana, 2015).

Open coding was employed in order to capture sentence fragments that did not answer a specific question or that were difficult to classify within any one existing code (Saldana, 2015). They were coded using a freeform explanatory coding structure. While open coding (or initial coding as it is sometimes called) is often the first step in coding, in this case it was performed in parallel with focused coding, as there were pre-existing questions that the researcher was asking and therefore specific responses in the data that could be coded for from the outset. This was primarily done during the first round of coding. The second round of coding involved simplifying codes where necessary, merging codes that were similar and incorporating the freeform codes that could fit into the structured coding method.

According to grounded theory, the analytical process happens throughout the data collection and data coding process (Charmaz, 1996). The primary component of this analysis lies in the coding itself, as assigning a code to a sentence fragment is itself an interpretive and thus an analytical practice. The second component of the analysis was also performed during coding in the form of memo-writing. This practice involves writing explanatory notes on specific codes or pieces of text as the coding process is taking place. The purpose is to capture ongoing impressions from the researcher as the analysis of the text progresses. The third and last level of analysis takes place after coding is finished when the researcher can look at overall patterns, such as the frequency with which certain codes appear between interviews. It is also at this level that theory development takes place.

3.10 Conclusion

As mentioned in Chapter 1, this study aimed to address an important need that previous research had identified: that of information and support for organic agriculture in South Africa. However, in order to provide support, farmer needs first have to be identified. Thus, an exploratory approach was called for that captures farmer views and experiences. The research design aims to achieve this objective through the application of in-depth interviews that utilize structured and semi-structured questions, thus allowing for better capture of a wide range of opinions and experiences. In the next chapter the nature of farmer needs is detailed, as well as additional information that supports this central research aim.

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Chapter 4: Results

4.1 Introduction

The results collected from 27 interviews can be divided into three broad sections describing the current status of organic farming practice and support in South Africa. The first deals with the biographical data of the participants and includes details about the farming operation of each participant. The second deals with the access that participants have to information sources, what is lacking, how they are connected to other farmers and the way that universities might best support them. The third and final section details the challenges that they have faced, how they addressed those challenges and the way that outside factors have influenced that success.

The results of the qualitative questions can also be broadly grouped into ten themes. These themes are displayed in a thematic diagram below (Figure 4.1).

Figure 4.1: Thematic diagram of factors influencing the success of organic farming of the sampled population.

4.2 Biographical data

4.2.1 Farmer data

Table 4.1 shows the results of the biographical questions of the interview process. It includes the distribution of age, gender, ethnicity, and their level of education.

Table 4.1: Biographical data of organic farmers interviewed for this study; n=27.

Variable	Category	Value	
		n	Percentage
Gender	Male	25	93%
	Female	2	7%
Age	30-39	9	33%
	40-49	7	26%
	50-59	7	26%
	60-69	3	11%
	70-79	0	0%
	80-89	0	0%
	90-99	1	4%
Ethnicity	White	27	100%
Education	Matric	3	11%
	Diploma	6	22%
	Undergraduate	10	37%
	Post-graduate diploma	1	4%
	Honours	6	22%
	Masters	1	4%

Table 4.2 compares the age and education of two samples of organic farmers (this sample and one taken in 2001) and that of the general conventional farming population. The first organic sample and reference population are both from Niemeyer and Lombard (2003). This first reference population solely consist of commercial-scale farmers. The organic sample of 2017 refers to this study, and the second reference population is from Statistics South Africa (2016), which includes all scales of

farming (and not exclusively commercial-scale farming) and did not stipulate the number of participants in each category.

Table 4.2: Age and level of education of two sampled populations of organic farmers comparing variables from this study with those from Niemeyer and Lombard (2003) and two sampled populations of conventional farmers.

	Organic population (Niemeyer & Lombard, 2003)		**Organic population This study (2017)**		**Reference (Buro vir Markte en Media, 1997; cited in Niemeyer & Lombard, 2003)**		**Reference (Statistics South Africa, 2016)**
Age	Percentage	n	Percentage	n	Percentage	n	Percentage
Younger than 41	39.3%	11	37%	10	29.8%	50	25.5%
41 to 50	35.7%	10	33.3%	9	39.9%	67	20.9%
Older than 50	25%	7	29.6%	8	30.4%	51	53.2%
Highest qualification	Percentage	n	Percentage	n	Percentage	n	Percentage
Less than matric	0%	0	0%	0	3%	59	74.9%
Matric	10.3%	3	11%	3	48%	949	16%
Diploma	37.9%	11	22%	6	29%	573	8.7%
University degree	51.8%	15	67%	18	21%	415	

Table 4.3 shows the distribution of the length of farming experience, both overall (organic and conventional) as well for organic farming. For general farming experience, the majority of participants (52%) had less than 15 years of experience. For organic farming experience, the majority of participants (51%) had less than 10 years of experience, and none had more than 20 years of experience.

Table 4.3: Number of years of general and organic farming experience.

Variable	Category	Value	
		n	Percentage
Length of farming experience (general)	0-5 years	7	26%
	6-10 years	1	4%
	11-15 years	6	22%
	16-20 years	5	19%
	21-25 years	4	15%
	26-30 years	1	4%
	31-35 years	2	7%
	36-40 years	1	4%
Length of farming experience (organic)	0-5 years	12	44%
	6-10 years	2	7%
	11-15 years	11	41%
	16-20 years	2	7%
	21-25 years	0	0%
	26-30 years	0	0%
	31-35 years	0	0%
	36-40 years	0	0%

Participants were also asked what motivated them to switch from conventional to organic farming methods (for a descriptive definitions of these terms, see Chapter 1). The main responses to this question are recorded in Table 4.4, below. Participants were then asked to select the single most important motivating factor for switching over to organic methods. The main responses to that question are recorded in Table 4.5.

Table 4.4: Frequency of listed motivating reasons for switching to organic methods.

Observation	Frequency
Health and safety	13
Market access	13
Care for environment	12
Competitive advantage	7
Better quality product	6
Price premium	5
Morally right	5
De-commodification of product	4

Table 4.5: Frequency of main reason for switching to organic methods.

Observation	Frequency
Environmental sustainability	10
Price premium	3
Better quality product	2
Health and safety	2
Market access	2
Wholesomeness of the system	2

4.2.2 Farm data

Farm level data were also recorded. Table 4.6 shows the total size of the farm, how much was under organic cultivation, and how much it cost annually to be certified.

Table 4.6: Summary of farm level data for sample population, n=27.

Variable	Category	Value	
		n	Percentage
Farm size (ha)	0-250	15	56%
	251-500	3	11%
	501-750	1	4%
	751-1000	0	0%
	1001-1250	1	4%
	1251-1500	1	4%
	1501-2000	1	4%
	2000+	4	15%

Table 4.6 (cont.)

Size of organic land (ha)	0-25	8	30%
	26-50	6	22%
	51-75	3	11%
	76-100	2	7%
	101-125	1	4%
	126-150	4	15%
	151-175	1	4%
	176-200	1	4%
	200+	1	4%
Cost of certification (Rand)	0-20 000	14	54%
	20 001-40 000	8	31%
	40 001-60 000	3	12%
	60 001-80 000	1	4%

Figure 4.2 shows the relationship between non-certified land and land under organic certification. Data points represent individual farms and are organized by total farm size and exclude two outlying data points originating from extensive livestock systems.

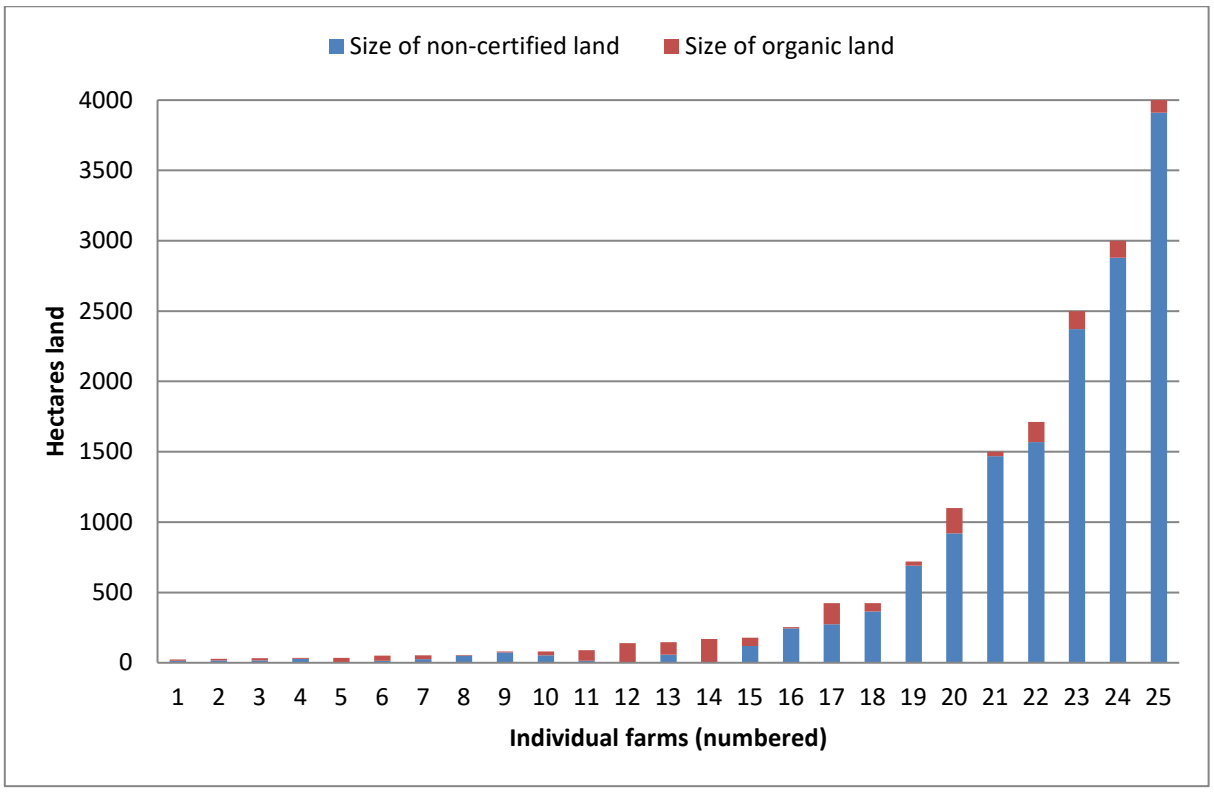


Figure 4.2: Comparison of size of organically certified land versus size of non-certified land on farm, n=25.

For the sampled population, land under organic certification does not increase by the same ratio as general farm land increases (Fig. 4.2). For the 15 smallest farms (all under 200 ha) more than half of total farm land was certified as organic, while for larger farms (200 ha or larger) only about 1/10 was certified as organic.

The ratio between value-based reasons for converting to organic (care for environment, health and safety, etc.) and market-based reasons for converting (price premium, market access, etc.) also differed between large and small farms. Participants with small farms mentioned value-based reasons twice as much as market-based reasons (1:2), while participants with large farms mentioned value-based reasons about one quarter less than market-based reasons (1:0.77).

Figure 4.3 shows the main crops under organic production for the 2016/2017 growing year, in terms of area planted for the sampled population (n=26) (one participant did not report number of hectares under production). Fruit and wine grape production make up more than half of production by area.

One observation each of pasture, hay, sheep and cattle was also recorded, but was not included in the graph because of the different ways of recording the production of such farming outputs.

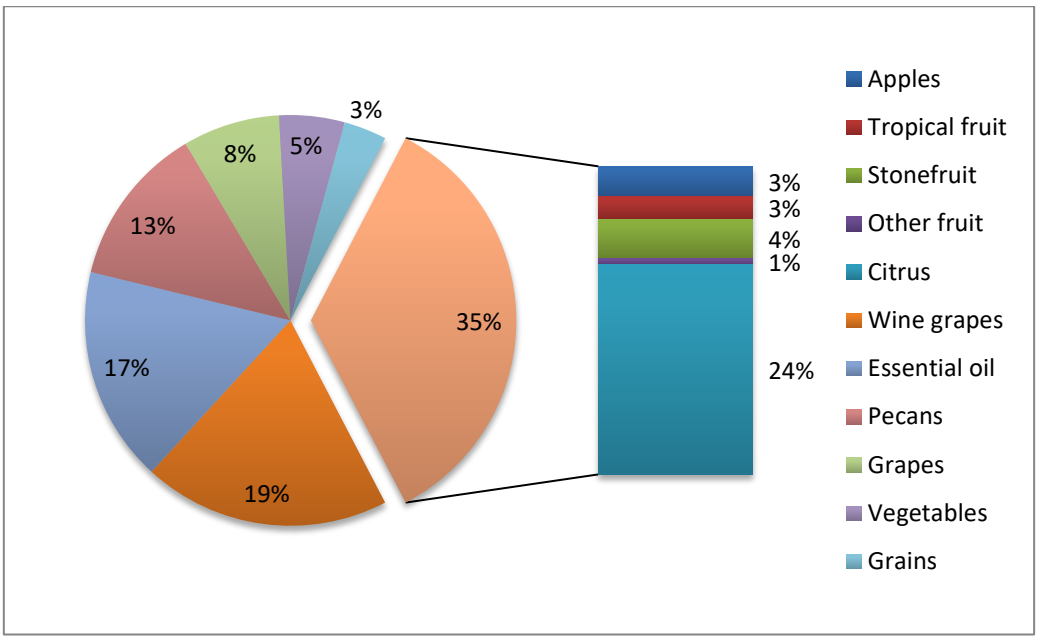


Figure 4.3: Type of crop under organic production by percentage of total hectares of sampled population for the 2016/2017 growing year, n=26.

Table 4.7 compares the organic yields from the sampled population with those of the national average for South Africa for three crops. These crops were chosen because of the availability of industry information. Information on national productivity were drawn from various industry and government reports (Citrus Growers' Association of Southern Africa, 2017; DAFF, 2017; SAWIS, 2017).

Table 4.7: Comparison of yield between conventional and organic production systems for three crops.

Crop	Yield: Organic (tons/ha)	Yield: Conventional (tons/ha)	Yield gap (percentage)
Citrus	23.56	31.08	24.2%
Grapes (wine)	7.65	15.2	49.67%
Grain	4.15	4.87	14.78%

Figure 4.4 shows the destination of farming outputs, produced in 2017, once they have left the farm gate. Please note that this does not represent the final destination of the product, as many farming outputs such as wine grapes were processed on site or sold on the local market to wine cellars that would eventually export their wine to other countries. As it becomes difficult to account for such eventualities, only the next step in the food value chain was requested.

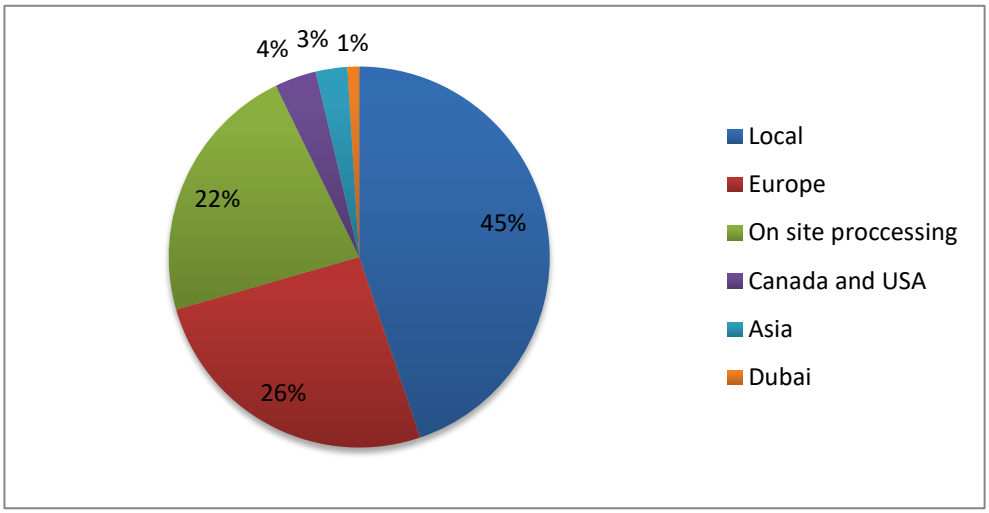


Figure 4.4: Destination of organic farming outputs for 2017 from participants, n=27.

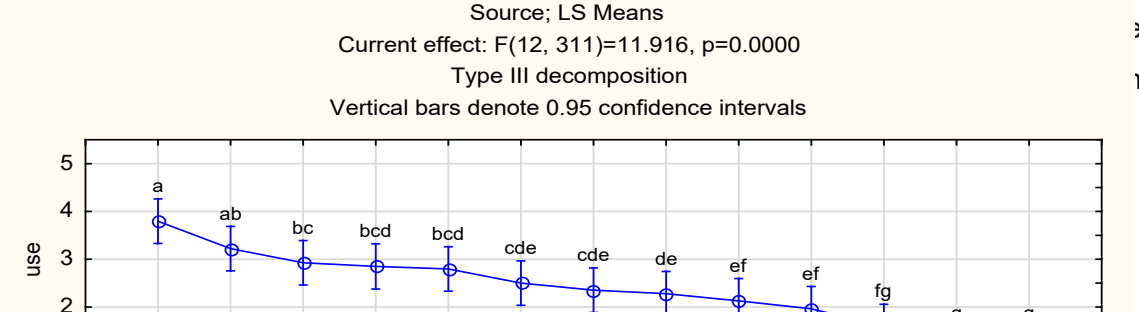
4.3 Farmer connection and access to information

Access to information on organic practices was reported as a near universal problem, as 93% of participants (n=25) reported that they were experiencing difficulty accessing information on organic practices. Specific areas of information that were identified are summarised in Table 4.8.

Table 4.8: Frequency of listed gaps in information on organic farming systems.

Observation	Frequency
Marketing	6
Soil management	6
Pest and disease management	5
Weed control	5
Allowed inputs	3
Sourcing inputs	3
Technical information	3

Along with identifying knowledge gaps, participants were also asked to rate the frequency of use and the usefulness of a series of potential sources of information on organic farming practices on a Likert-scale ranging from one (never used and no applicable information) to five (very often used and very use r labels are nfidence inte



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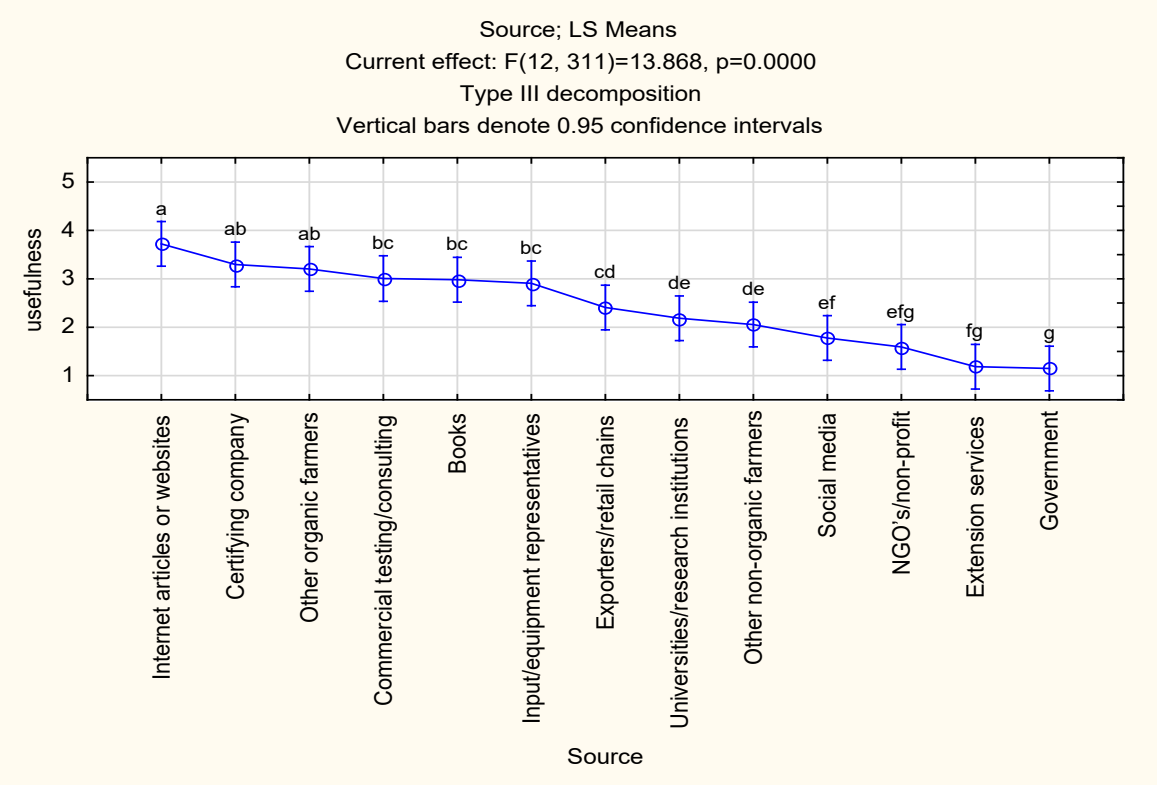

Figure 4.6: Comparison of Lickert-scale of information sources scored by usefulness.

As can be seen from the results above (Figure 4.5 and Figure 4.6), participants consulted other farmers for advice. In subsequent questions 74% of participants (n=20) indicated that they had some

connection with other organic farmers, while 85% of participants (n=23) had some connection with conventional farmers. In total, participants mentioned connections with organic farmers 33 times, while connections with conventional farmers were mentioned 49 times.

Figure 4.7 shows the geographical distribution of participants (black dots) within South Africa. The black lines show the connections between participants as well as other organic farmers not captured in this study (either because of non-response or because they were certified by the certifier that did not disclose their client lists) (white dots). This connection implies that a participant knows a farmer well enough to have contacted them at least once.

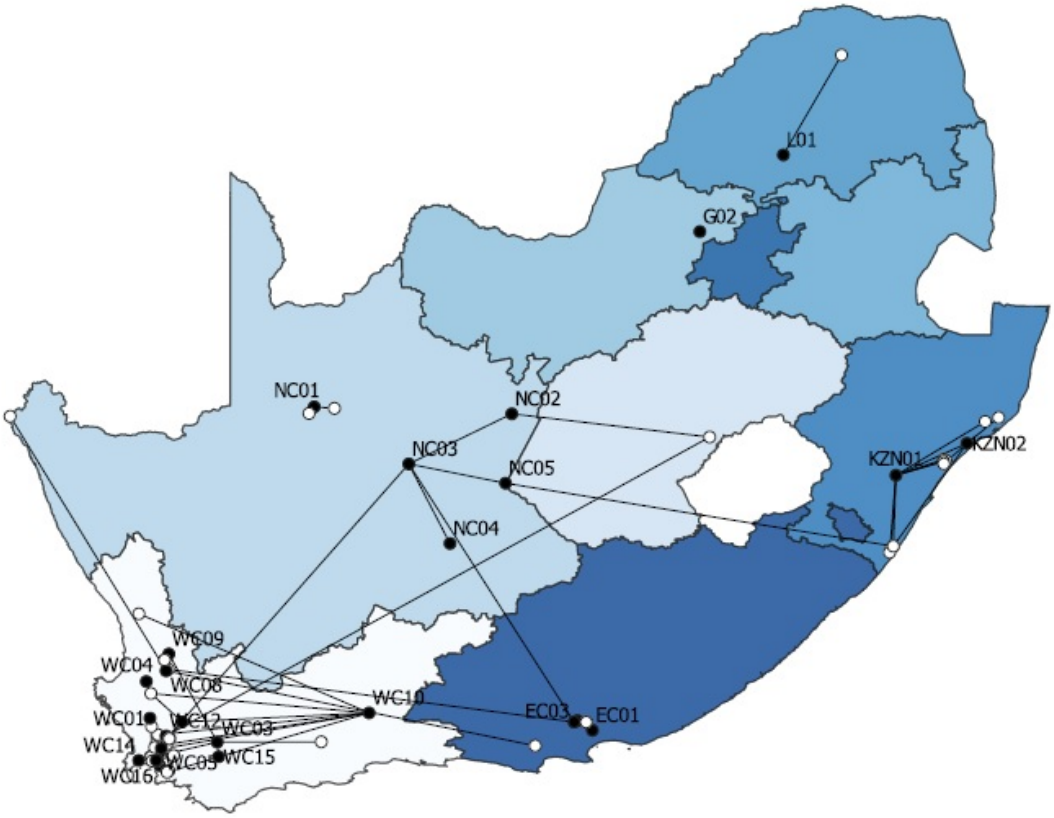

Figure 4.7 : Map of participants (black dots) and connections to other participants and other organic farmers (white dots).

In order to better understand the connection that organic farmers have with each other, participants were asked to what extent and for what reasons they connected with other organic farmers. The most frequently mentioned reasons can be seen in Table 4.9.

Table 4.9: Frequency of listed motivations for connecting with other organic farmers.

Observation	Frequency
Asking advice	8

Part of growers group	6
Provides knowledge to new farmers	2
Social connection	2
Part of an organic study group	2
Supplies them with inputs	2

As can be seen from Table 4.9, two participants were involved in organic study groups, an adaptation to the lack of available support and information on organic practices. Here one participant describes why they formed a study group:

> *"…the lack of information about organic farming in South Africa, there was none. We quickly realized that we needed to become the experts on this field, because we weren't going to get help anywhere else. So it was a case of we had to get together because there was no advice from any agrochemical company, there was no technical advice, because no-one had done this before."*
>
> *EC02*

Participants were also embedded within existing farming communities that mainly consisted of conventional farmers, and thus also connected with them for various reasons. In order to better understand the dynamics of this connection, participants were asked to what extent and for what reasons they connected with conventional farmers. The most frequently mentioned reasons can be found in Table 4.10.

Table 4.10: Frequency of listed motivations for connecting with conventional farmers.

Observation	**Frequency**
Social connection	7
Part of local farmers association	6
Asking advice about farming	5
Part of larger growers group	4

Figure 4.8 compares the frequency of connection with both other organic farmers and conventional farmers. This was measured by how often participants would contact these farmers, either by calling,

emailing or speaking to them in person. A low connectivity represents a frequency of contact of a few times a year or less, a medium connectivity represents a frequency of contact of every few months, while a high connectivity represents a frequency of contact of every few weeks to every few days.

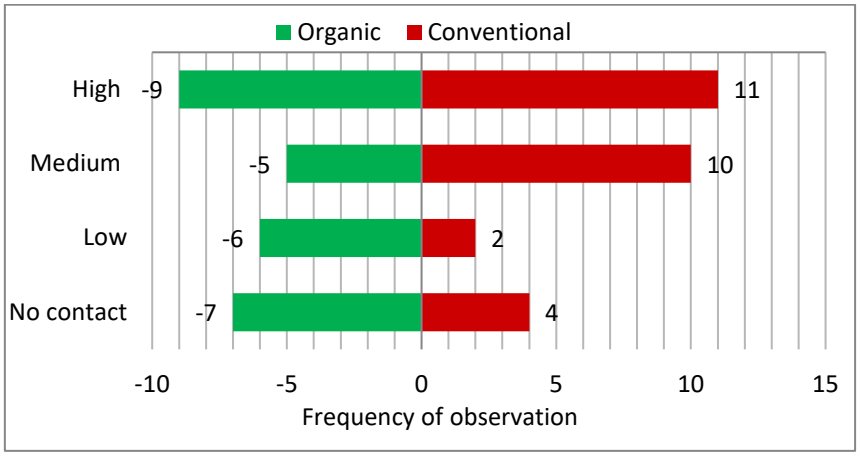

Figure 4.8: Frequency of contact of participants with organic and conventional farmers.

Because universities and other research institutions are responsible for conducting original research in order to fill existing knowledge gaps, participants were asked what role they think universities and other research institutions could possibly play in addressing the gap in knowledge production and dissemination about organic farming in South Africa. Table 4.11 shows what roles were most mentioned and the frequency with which they appeared in the interview data.

Table 4.11: Role that universities can play in addressing knowledge gaps in organic agriculture in South Africa.

Observation	Frequency
Research organic management adapted to local conditions	8
Prepare students with both conventional and organic knowledge	8
Research all aspects of organic systems	6
Create a central knowledge hub for organic farmers	4
Research pest and disease management	3
Research fertility management	2
Research improvement of organic management strategies	2

Research input alternatives	2

Creating locally adapted research for organic systems was one of the most frequently mentioned observations in Table 4.11. Below, one participant reflects on the applicability of research conducted in other countries, and the lack of research on local conditions:

> *"Daar is eintlik maar nie baie wat gemik is op Suid Afrika nie, veral nie in 'n droëland toestand nie. Al die organiese goed is daar in Hawaii of in die Filippyne of in Indië, maar ons sit met 'n droë winderige klimaat, veral hier in [plaas] en neëntig persent van die goed wat jy lees op die internet kan nie hier aanpas nie, jy moet ander maniere vind om te groei."*
>
> *WC07*

[Translation: There isn't a lot of information aimed at South Africa, especially dry-land conditions. All the organic stuff is in Hawaii or in the Philippines or in India, but we have a dry, windy climate, especially here in [farm] and ninety percent of the things that you read on the internet cannot be adapted to this area, you need to find other ways to grow.]

Incorporating material on organic management into tertiary curriculums was another of the most often mentioned observations in Table 4.11. As one participant mentioned, graduates are not prepared to work with organic farming systems, and conventional farming knowledge can be counter-productive in such situations:

> "*Ek dink dit is ook so bietjie van 'n uitdaging om jong mense wat by jou kom werk half te ontleer wat hulle nounet baie geld voor betaal het en vier, vyf jaar voor geleer het*."
>
> *WC16*

[Translation: I also think it's a bit of a challenge, with the young people that come and work for you, getting them to unlearn the things they paid a lot of money for and studied four or five years to acquire.]

Another participant reflects on their own tertiary education, as well as the paradigm of (conventional) agricultural management during their time of study:

> "*Obviously, mens kan niks leer oor hierdie tipe [organiese] praktyke in universiteite nie, ek meen ek het landbou geswot en in landbou leer hulle vir jou 'jy sien hierdie gogga dan spuit jy daai gif, jy sien hierdie ding dan gooi jy daai kunsmis'. Ek is baie teleurgesteld oor wat universiteite vir jou leer oor landbou as 'n geheel, organies of nie organies.*"
>
> *NC03*

[Translation: Obviously, one cannot learn about these types of [organic] practices, I mean I studied agriculture and there they taught you 'if you see this insect then you spray this pesticide, if you see this then you apply this fertilizer'. I am very disappointed in universities about the kind of things that they teach about agriculture in general, organic or not.

4.4 Challenges and solutions

Participants reported on many challenges that they faced, both on the farm level, as well as within the wider context of the food value chain, local and international politics and the free market system.

The challenges that they faced when initially converting to organic farming methods, as well as the challenges that they currently face are summarised as Table 4.12 and Table 4.13.

Table 4.12: Most common challenges experienced after conversion.

Observation	Frequency
Pest and disease management	11
Sourcing inputs	10
Lack of information	9
Weed control	7
Finding markets	5
Conversion period	4

Table 4.13: Most common challenges currently experienced.

Observation	Frequency
Weed control	8
Sourcing inputs	5
Access to markets	4
Lack of consumer awareness	4
Nitrogen management	4
Cost of labour	3
Pest and disease management	3

Overall there is a reduction in the frequency with which challenges were reported between the two time periods. Past challenges were mentioned 96 times, while current challenges were mentioned 53 times.

Besides being asked about farm-level challenges, participants were also asked to list external factors that were influencing their ability to be successful as an organic farmer in South Africa. This included local, regional or international scale challenges. Specifically, participants were asked about what larger scale interventions would be necessary in order to ensure a more successful organic agricultural sector in South Africa. The most common responses are recorded in Table 4.14.

Table 4.14: Frequency of external factors listed as necessary for a more successful organic sector in South Africa.

Observation	Frequency
Educated consumers	15
Local organic standards	6
Increased demand for ethical and high quality foods	3
Financial support from government	3
Marketing support from government	3

How participants overcame past challenges, and the specific solutions that they employed to do so are tabulated in Table 4.15, below.

Table 4.15: Frequency of listed solutions that were employed for past challenges.

Observation	Frequency
Finding information	9
Practical experimentation	9
Connecting with other organic farmers	5
Perseverance	5
Sourcing effective inputs	4
Crop rotations for fertility management	2
Making own compost and other fertility preparations	2
Mechanization	2

On site processing/value-adding	2
Securing markets before planting season	2
Using organic consultants	2
Weed netting for weed control	2

Participants were also asked about best practices that they employed, or would recommend as necessary for farmers to practice within an organic system. The most common responses are recorded in Table 4.16.

Table 4.16: Frequency of listed important practices for success as an organic farmer.

Observation	Frequency
Understanding the different paradigm	8
Building good soil	8
Creating a balanced agro-ecosystem	6
Perseverance	6
Building a brand	3
Building good soil before conversion	3
Making own compost	3
Market access	3
Understanding your soil and climate	3
Using varieties adapted to climate and soils	3
Effective weed management	3

Both Table 4.15 and 4.16 list perseverance as an important aspect of addressing challenges faced during and after conversion and ensuring success as an organic farmer. Such a term perhaps hints at the stress involved in converting a farming system from conventional to organic. A process that certainly also has financial implications. As one participant notes about helping other conventional farmers to convert and their own financial trouble:

> *"One or two of them have tried to go organic and we tried to help them and assist them, but two years into conversion they turned around and said, "No, this is crazy". When you ask people, well why do you farm organically? Is it financial viability? That's the biggest mistake*

you can make. I only broke even for the first time after eight years, it took me eight years to get to break even scenario."

EC02

4.5 The organic paradigm

During the coding process, a theme emerged that was not initially captured by the data collection instrument. An overview of the existing codes during the first round of coding revealed similarities in the way that participants thought about organic farming and the way they managed their farming systems. A second round of focused coding revealed more of these similarities. This theme of an 'organic paradigm' is displayed as a thematic diagram consisting of codes associated with this paradigm and are grouped into sub-themes by colour and is included as Appendix C.

4.6 Conclusion

In summary, the results above serve to answer the four central research questions. Farmer and farm data (Section 4.2) as well as the map of Figure 4.7 answer the first research question: how are farmers divided in terms of geographical location, biographical information and motivation for converting to organic production. The Likert-scale questions of Figure 4.5 and 4.6 detail the sources of support that participants have access to, while Table 4.9 and 4.10 point to some of the support offered by farmers, both organic and conventional, that participants are connected to. This serves to answer the second research question: what are the main sources of support for organic farmers in South Africa? Sections 4.3 and 4.4, and especially Table 4.11, also hint at the answer to the third question: how can universities best support South African organic farmers? Finally, he information gaps from Table 4.8, along with the other challenges mentioned in Section 4.4 serve to answer the fourth question: what are some of the challenges that organic farmers face in South Africa? The implications of the results detailed in this chapter and how they pertain to the research questions are discussed in more detail in the next chapter.

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Chapter 5: Discussion

5.1 Introduction

This chapter discusses the results of the previous chapter and provides insight into some of the findings and contextualises them within the current literature. Sections 5.2 and 5.3 outline the typology of both the farmer and the farm, while section 5.4 details the motivations of participants for converting to organic farming. Sections 5.5 and 5.6 discuss the information gaps experienced by participants and the sources of information they currently utilise. Section 5.7 discussed how and for what reasons participants connected with both organic and conventional farmers. Section 5.8 details the role that universities might play in supporting organic farmers and discusses the current shortcomings experienced by participants in this regard. Section 5.9 and 5.10 describe the challenges that participants faced during their conversion to organic farming, as well as the ongoing challenges they experience. Section 5.11 and 5.12 detail the external factors influencing the perceived success of participant. This mainly includes the policy environment and the market and consumer preferences. Lastly, section 5.13 highlights aspects of an organic paradigm that emerged in the interviews with participants, one that informs the approach of many of the participants.

5.2 Farmer typology

All participants (n=27) were white, the majority were male (93%) and older than 40 years of age (67%). Participants were also relatively well educated, with all participants having completed high school and the majority (89%) had a tertiary qualification (combines the “diploma”, “undergraduate”, “post-graduate diploma”, “honours” and “masters” category; see Table 4.1). Data on the demographic composition (age, gender, education, etc.) of commercial farmers remains scarce and piecemeal for South Africa, both for conventional and organic farmers, but especially so for the latter. However, Table 4.2 provides some basis for comparison. It shows very similar age compositions between two similar samples of organic populations, even though they have been sampled 17 years apart. Farmers from this study however were better educated than those in 2001, showing a 15.1% increase in university education. The participants from this study were also better educated and younger than those from both reference populations.

White, male land-users are dominant in this sample. If this reflects the composition of the entire sector and how the proportion compares with the demographics of the mainstream commercial farming sector, remains to be investigated. The nature and process of organic certification, however, may be selecting farmers that are already well-established commercial farmers, a sector that is still

composed of a majority of white farmers (Walker & Dubb, 2014). Organic certification requires a high enough turnover to break even or exceed the expense. It requires formalised systems of record keeping for yearly audits, and may require sophisticated tools beyond the reach of the more resource poor emerging farmers in South Africa and other developing countries (Gómez et al., 2011). Such an expensive and time consuming process of certification is usually only pursued in the case where formal markets require high levels of traceability, such as retail chains or for export (Jouzi et al., 2017). Thus, only well-established commercial farms have any reason to obtain such certification. The commercial farming sector of South Africa remains a white dominated sector, and the proportion of certified organic producers may reflect the same tendency (Walker & Dubb, 2014). There are examples where this is not the case, such as the Heiveld rooibos tea co-operative made up entirely of previously disadvantaged, small scale coloured farmers (Malgas et al., 2011). These examples, however, are rare, and are most likely the exception rather than the norm.

More than half (52%) of participants also received their certification less than ten years ago, with 45% the participants with five or less years of organic certification. This represents new entrants into the organic sector. This may be an indication that the sector is growing in South Africa, but more data would be required to confirm this.

The distribution of participants is also skewed across the country (Fig. 4.6). Over 55% (n=15) of participants were from the Western Cape Province, with the next most from the Northern Cape at only 18.5% (n=5). The remaining participants were distributed between the Eastern Cape (n=3), Limpopo (n=1), KwaZulu Natal (n=2) and Gauteng (n=1). This shows similarity with the findings of a previous report, which also found a majority of participants to be located within the Western Cape (INR, 2008). It is unclear why the majority of participants were located within the Western Cape, but one possible explanation could be the well-developed wine and fruit sectors of the province, two export products more likely to be certified as organic in order to access international markets. These statistics are simply for comparative purposes, and do not represent statistically significant figures (see Chapter 3, section 3.7).

5.3 Farm typology

According to the last agricultural census of the country in 1996 that included both number and total hectares of commercial farms, average farm size varied between 323 ha and 4418 ha between the provinces, with a national average of 1349 ha (DAFF, 2013). In comparison, farm sizes for those interviewed had a median value of 147 ha with a median of 35 ha certified as organic, far below even the lowest parameter of the general commercial farming population. The size of farms has also been increasing since 1996, so the difference in size is most likely even larger at present (Liebenberg, 2012).

It is also worth noting that the proportion of organic land does not necessarily increase as total farm size increases for those interviewed (see Figure 4.2). This could possibly suggest some barrier to expansion for those participants with low proportions of organic land relative to total farm size. As many participants have been certified for five years or less, perhaps the organic portion of production remains an experiment, as has been found in previous research (Lampkin, 1993; cited in Padel, 2001).

Participants surveyed were involved in a diverse range of cropping and livestock systems, though most were producing high value crops such as fruit, essential oils or wine grapes (Figure 4.3). These types of crops were either exported, or sold on the local market (Figure 4.4). Further processing and value addition could happen on-site, locally or elsewhere. Determining where such products were sold was difficult once the crop left the farm gate (for example, wine grapes). Many of these products were also destined for international markets or for premium retailers on the local market (personal communication, participant WC01). In cases where lower value crops (such as cereals) were produced, participants utilized the alternative nature of their production to differentiate themselves from the rest of the market (personal communication, NC03). These participants built a brand around their organic production methods in order to free themselves of the commodity pricing that many agricultural products such as cereals are subject to (personal communication, NC03; NC05). These producers also employed other strategies to add value to their product. This includes owning other aspects of the value chain, such as a butchery in the case of animal products, or milling grains into flour in the case of cereals. This allows these products to be sold at higher prices, as they are no longer simply agricultural outputs, but products in their own right.

On-site processing was also employed by 22% of participants (Figure 4.4). In the case of vineyard production this was to make wine, while for other crops this was usually used to effectively deal with surpluses or to process lower quality products not suitable for the market.

For illustrative purposes, three crops were compared to national productivity levels. Yield gaps exist for all three crops (Table 4.7), with that of wine grapes being the most significant. A possible explanation for such a large yield gap for wine grapes could be the objective of the farmers in question. In order to produce premium wines, viticulturists reduce the number of clusters on the vine, known as cluster thinning, in order to increase the sugar content and other quality aspects of the remaining fruit (Kliewer & Dokoozlian, 2005). Because premium markets are willing to pay higher prices, and thus afford organic products, these farmers are most likely voluntarily reducing their yield in order to maximise quality and access these markets (personal communication, WC10).

5.4 Motivation for converting

In terms of motivation for converting to organic farming, the responses from this study show that environmental sustainability is only one of a host of reasons for conversion. However, when asked for the primary motivation, 52% of participants cited a value based reason, such as environmental sustainability (Table 4.5).

Close to half of participants listed health or safety concerns (this included concern for self when dealing with the hazardous chemicals of conventional farming, concern for family who might eat from the farm after it has been sprayed and concern for the health of consumers who are eating previously conventionally managed products) as one reason for converting (Table 4.4, f=13). Many spoke about directly seeing the impact of working with hazardous chemical pesticides, or realizing the danger that crops sprayed with such substances might pose to their own children. These participants wanted to produce a crop that they would know would benefit the health of their own families as well as those of their customers.

The other motivator mentioned as often as the rationale for health and safety was that of access to markets (Table 4.4, f=13). 48% of participants mentioned better access to markets afforded them by their conversion to organic farming. Many of the crops being produced (such as wine and fruit) were aimed at the export market. Countries in Europe (such as Germany, France, Italy and Switzerland) and the USA have some of the largest markets for organic products (Willer & Lernoud, 2018). Converting to organic farming thus represented a good avenue to open previously inaccessible international markets.

Care for the environment was next frequently mentioned (Table 4.4, f=12). The philosophy of organic agriculture is primarily concerned with the effects that conventional agriculture has on the environment, thus providing a framework for participants who were disillusioned with the conventional model and looking for an alternative (Beus & Dunlap, 1990).

Comparing the reasons cited for converting between participants with a high proportion of organic land and those with a low proportion, some differences can also be observed. Participants with higher proportions of organic land relative to their total farm size (more than 50%) cited value-based reasons such as care for the environment or health and safety 2.5 times more than market based reasons, while those with lower proportions of organic land (less than 50%) cited market based reasons 1.30 times more than value based reasons. This may suggest that farmers with only small proportions of organic land are most likely trying to access the marketing benefits of organic production or are first experimenting with the economic success of this type of agriculture before converting more land.

5.5 Information gaps

From the literature as well from participant interviews it is clear that there is a dearth of information on organic agriculture in South Africa. This has been corroborated by participants, as almost all of them (n=25) reported a lack of access to sufficient information on organic farming practices and related information.

As seen in the previous chapter, the kinds of information gaps that were most often mentioned (Table 4.8, f=19) were those of a technical nature. These technical issues such as pest and disease control, weed control and soil management are all issues that require new strategies for management within an organic system. Adoption of organic management strategies require the uptake of new forms of knowledge, not simply of technical substitutions, but more complex, system level interventions (Padel, 2001). This represents a significant knowledge burden on farmers, in other words, acquiring the knowledge to effectively convert to a new farming system requires a significant investment of time and resources, especially in the case where even basic information is not available. This was also specifically highlighted by participants as a challenge when they were newly converting to an organic system (Table 4.12, f=9).

Lack of information on markets and marketing was also listed as an information gap (Table 4.8, f=6). In the case of organic farmers there is little institutional or industry support in South Africa for marketing. One organization, SAOSO does exist, but according to Manderson (2015) was considered to be inactive. SAOSO has, however, shown renewed activity and has recently managed to finalise the development of organic standards for South Africa, and, with PGS South Africa, is currently involved in training in seven provinces of South Africa (Auerbach, personal communication, November 2018). Furthermore, the way that organic products are marketed and sold often differs from conventional products. Many organic products are marketed and sold to niche markets and part of the incentive to convert to organic is the possible price premium that can be obtained for such products within these niche markets. However, this requires innovative marketing strategies in order to differentiate such a product in the market, and in turn new forms of knowledge to drive such strategies.

Information on what specific products can be used and where to find them is another issue mentioned (Table 4.8, f=3). Part of converting to organic management is using different products to control pests and diseases and finding new nutrient inputs for fertility management. In order to conform to certification standards, farmers are only allowed to use a small number of approved inputs, according to the standard they are certified to. According to one participant there is no pre-approved list that they have access to. Should a farmer want to use a new product, they have to get approval from their certifier first (personal communication, KZN02). This has to happen on a case by case basis, which requires time and effort on the part of both farmer and certifier.

In South Africa, conventional farmers have a variety of information sources to draw from. This includes university research, government based organizations such as the Department of Agriculture and Forestry (DAFF) and the Agricultural Research Council (ARC), government funded extension services (usually focused more on emerging farmers), sector specific non-governmental organisations such as GrainSA, agricultural publications such as Farmers Weekly, farmer's days and agricultural exhibitions, and professional consultants. All of these different actors and events provide a dense network of potential sources of agricultural information that conventional farmers can call upon in order to improve their management practices. Although organic farmers have access to the same information, little of this information network is relevant to organic farmers and as a result they have very few sources to draw from.

5.6 External sources of information

In order to gauge the potential support that organic farmers have access to, participants were asked to score thirteen potential sources of information on organic agriculture and its related activities (such as marketing) in terms of how frequently such sources were consulted and how useful they found such information to be (Figure 4.5 and Figure 4.6). In both cases internet articles and websites (which included peer reviewed journals and scientific papers) were ranked as the most frequently accessed and most useful. This is unsurprising, as internet sources are highly accessible, at least to this cohort of farmers, even in remote locations. Many participants did report, however, that the articles and websites that they drew from were almost always from international sources and in certain cases had limited applicability due to the content dealing with climates and management systems that was not applicable to the local South African context.

The next highest ranking source of information for organic farmers in this study was their certifying company. Such organizations are meant to remain impartial and are therefore not allowed to provide any sort of advice to their clients. However, producers still have to work closely with their certifier in order to ensure compliance to the organic standards. This involves communicating the standards of production to clients, communicating any new amendments that come into effect, as well as giving the go-ahead with any new changes in management of the farm that are not sufficiently covered by the standards or seem ambiguous with regards to the standards. While these activities are not considered 'advice', they are nevertheless critical for maintaining the certified status of farms. Thus, certifying companies also provide essential information necessary to run a certified organic farm.

Government and public-funded extension services were both ranked the lowest across both categories with regard to frequency of access and usefulness to participants in this study. According to DAFF's Integrated Development Plan, "since 1994, State support has largely shifted away from the large-scale commercial farming subsector, in favour of smallholders and subsistence producers"

(DAFF, 2012). As discussed in section 5.2, certified organic agriculture would be classified under commercial farming, in the absence of specific policy directed at its development, and so would fall outside of current strategic objectives of the DAFF.

5.7 Farmer connections

What was also strongly communicated in this study was the role that other organic farmers play in knowledge sharing amongst this cohort of farmers. “Other organic farmers” as a source of information was on average ranked third highest both in terms of frequency of use and usefulness (Figure 4.5 and Figure 4.6). When asked about the reasons why participants were connecting with farmers it was most often to share information and transfer knowledge (Table 4.9, f=12; combines the categories “Asking advice”, “Provides knowledge to new farmers” and “Part of an organic study group”). This takes on a variety of forms, whether just through social contact, calling someone to ask advice on a specific question, WhatsApp groups, providing regular advice to recently converted farmers growing similar crops or through forming study groups as a regular co-learning space for a group of farmers.

These farmer networks not only facilitate the spread of information, but also have a supportive capacity for those in the network. For farmers these networks are often also social in nature, through casual interaction with neighbours, they receive support as well as knowledge.

Some participants (Figure 4.8, n=7), however, reported no contact with other organic farmers. This was frequently because of geographical isolation. With such a small population of certified organic farmers located across a fairly large country, many organic farmers are hundreds of kilometres away from their closest peers.

While being organically certified separates these farmers from the mainstream to some degree, participants were still embedded within a larger farming community. While social connection with conventional famers was the reason most often mentioned for connecting (Table 4.10, f=7), other aspects were also factored in. Some participants (Table 4.10, f=6) were part of local farmers associations (institutions that still play an important role in social integration in rural farming communities in the country (personal communication, participant NC05) and some still contacted conventional peers to ask about general farming advice. Many of the participants were also not exclusively organic farmers, some had only converted small portions of their land to organic in order to experiment with the viability of this new farming method, while others have established systems using both kinds of farming systems. In these cases participants were also part of larger (conventional) growers groups.

5.8 The role of universities and other tertiary institutions

Besides government, universities are also public-funded institutions and thus have a duty to serve the wider public. They are, after all, one of the main institutions responsible for knowledge generation and synthesis. Thus, where knowledge gaps exist universities have a responsibility to study and fill those gaps. With a pressing issue such as sustainable agriculture, this responsibility is doubly important.

When asked what sort of role they see universities play in supporting them, most often, a need for more research into locally adapted management and locally adapted crop varieties was mentioned (Table 4.11, f=8). What was also identified was that the current university curriculum does not sufficiently communicate organic management options (Table 4.11, f=8).

As discussed above in Section 5.5, participants reported that the internet was a main source of information, and that they read, among other things, articles and peer reviewed research in order to improve their practice. This research happens almost exclusively in other countries and thus applies to climates and management contexts different from those in South Africa. This is also illustrated by the quote by WC07 (Chapter 4, p. 52). Participants are in need of research for their own geographic situation. A lack of knowledge on organic management strategies in drier climates and for dry-land conditions were just some of the research gaps mentioned.

Sustainable agricultural practices have only gotten mainstream appeal quite recently, and university curricula reflect this fact. In South Africa agricultural bachelor training still closely follows the conventional agricultural paradigm.

The quote by NC03 (Chapter 4, p. 53) reflects the simplistic way that most farmers have been taught to manage agricultural systems in the past. The reductionist approach that science employs is partly to blame for this. For a very long time most agricultural management was seen as a straightforward process, where certain interventions would result in predictable results, irrespective of local context (Pretty, 1994).

To an extent this has changed in modern university curricula, with certain universities developing programs that focus explicitly on teaching sustainable models of agricultural production (Francis et al., 2011; Jacobsen, 2012; Parr & Horn, 2006). How curriculums at South African universities have integrated sustainable agriculture remains uncertain, however.

The lack of proper training in organic methods at tertiary institutions has also resulted in extra time and resource expenditure required to train farm managers and other skilled personnel that are employed on organic farms.

A possible solution to the lack of knowledge access, some participants suggest, involves the creation of a knowledge hub by a university or other organisation that would compile and synthesise current research on organic farming practices (Table 4.11, f=4). As mentioned previously many participants consulted peer reviewed journals and other forms of primary literature as one source of information. However, much of this kind of information is inaccessible to those outside of university structures, as many journals limit access to their content with paywalls. Furthermore, searching through various sources, perhaps without a firm grounding in the natural sciences or statistical methods, creates a further drain on time and resources for farmers. Compiling and synthesising research would enable a much faster and more effective rate of uptake of knowledge for farmers.

Interestingly, some participants (n=8) expressed doubts about whether South African universities would ever fulfil this research mandate. Participants seemed to believe that university research is funded by agribusiness and that they are thus setting the research agenda to strongly favour conventional agriculture. While this may be a common perception, many different funding structures exist, such as the National Research Foundation (NRF), which funds agricultural research, such as the first organic farming systems research at Nelson Mandela University (Mashele & Auerbach, 2016). To what extent research agendas at tertiary institutions make sustainable agriculture, and specifically organic agriculture, a priority remains a question to be asked, however.

5.9 Conventional to organic agriculture: challenges with conversion

5.9.1 Bio-physical challenges

Management of any natural system involves constant adaptation to changing conditions, even more so within a system that aims to mimic natural rhythms such as organic farming systems. Converting from a conventionally managed system to an organic one represents a significant shock to the agro-ecosystem and is often accompanied by various challenges that emerge during this time before the system can reach a new stable state. While it takes three years in which a farmer must manage the system organically in order to receive organic certification, during which they cannot yet label their products as organic, the biophysical effects of conversion may last a lot longer than this (Bellon & Lamine, 2009).

The most frequently mentioned challenge that respondents reported facing as new entrants to the organic sector was pest and disease management (Table 4.12, f=11). Under an organic model of production, conventional methods of pest control (such as synthetic chemicals) are no longer an option, and with crops that did not have to develop resistance suddenly exposed to higher pest and disease pressures, the system is likely to suffer.

This sudden shock can scare people off, deterring potential entrants to the sector from engaging in organic farming, as there is a very real risk of not being economically viable for that time.

Sourcing organic inputs was the next most frequently mentioned challenge in the interviews (Table 4.12, f=10). As mentioned in Section 5.4, knowing what inputs are allowed in an organic system represents a challenge, once this is known sourcing those inputs presents another challenge. Inputs such as fertility amendments, pesticides and fungicides represent a crucial avenue to addressing short term on-farm challenges such as pest outbreaks. Any products used on the farm have to have their own authorisation for use in an organic system and, because of the small market in South Africa, many of these registered products need to be imported, at some expense (personal communication, KZN02; The Council of the European Union, 2007).

Another challenge frequently mentioned is that of weed management (Table 4.12, f=7). Currently there are no registered organic herbicides on the market. Weed management requires a more holistic and multi-pronged approach, as no compound has been found that can control weed species that is also permissible in an organic system. In annual systems, such as cereal production, this problem is easier to manage as mechanical weed control strategies fit in well where tillage is already part of system management. In perennial systems such as orchards and vineyards mechanical weed control becomes more difficult and labour intensive, resulting in higher labour cost and potential inefficiencies.

5.9.2 Marketing and financial challenges

Of course it is not only the production aspects that change, but also the marketing aspect that presents new challenges to those converting. Aside from the lack of information on marketing mentioned in Section 5.4, some participants (n=6) reported that a price premium for an organic product is not guaranteed, but is rather determined by good marketing and building a recognizable brand and finding the correct markets that are willing to pay more for an organic product. Finding such markets can also be a difficult task after the conversion process, especially if that same product was previous sold as a commodity. The search for markets and the complete change in marketing approach that organic farmers have to undergo was also mentioned as one of the main challenges during conversion (Table 4.12, f=5). The double edged sword of organic production is that, on the one hand the product can be sold at a premium, but on the other hand this premium can only be obtained if the correct markets can be found. Extra attention must therefore be paid to securing markets. However, this still does not address the problem of surplus production, as the ability of the relatively small organic market to absorb surpluses is likely to be highly limited in South Africa.

Many participants also reported a time of financial struggle or taking financial risks in order to finance their ventures. This often involved self-financing, especially for those pioneers who converted a couple of decades ago. One participant spoke about his father being rejected by the banks when applying for a loan to convert his farm to an organic system. According to them, banks finance the agricultural sector based on models of the proposed system based on previous scientific and economic research (personal communication, NC05). Thus, because no such models existed for organic agriculture (and potentially still do not exist) during that time, no bank would be willing to approve a loan for such an operation. This inability of banks to properly account for and serve the organic sector is not only a problem faced by farmers in South Africa, but was also identified as a major constraint to the success of organic agriculture on the African continent in general (UNCTAD, 2016).

5.10 The changing nature of challenges over time

As participants became more familiar with managing an organic system, many of the previous challenges were no longer an issue. Participants applied a host of solutions to address the challenges they faced (Table 4.15). The main solutions employed were finding information (Table 4.15, f=9) and practical experimentation (Table 4.15, f=9). Compared to challenges mentioned at the start of conversion (Table 4.12), the challenges currently experienced by participants (Table 4.13) have changed. Pest and disease management, for instance, now ranks lowest in Table 4.13 (f=3) and lack of information is no longer present. To have been able to eventually convert to an organic farming system despite the initial challenges indicates that participants in this study had overcome these hurdles and points to where participants were able to adapt.

The relative success of organic farmers despite the challenges is not to say that the lack of support and information in the organic farming sector is to be justified or accepted. There were issues that, despite other successes, could not be solved. For example, weed management remained problematic and was most frequently mentioned in Table 4.13 (f=8). This is most likely because of the lack of simple and economical control strategies in organic management for weed control. There are no organic herbicides on the market, and proper weed control requires more holistic management strategies, such as combining crop rotations, cover cropping, tillage and timing of planting.

Procuring enough nitrogen is another systemic problem of organic agriculture (Kirchmann at al., 2008) (Table 4.13, f=4). Most nitrogen sources are difficult to apply accurately; as they are of biological origin they often require decomposition for the nitrogen to become available (Kirchmann et al., 2008). Timing nitrogen application for maximum availability thus exacerbates this problem, as lower nitrogen use efficiency requires higher application rates and could lead to leaching (Pimentel

et al., 2005). Sources of fertility such as compost and manure are also very bulky; the sheer volume of material necessary to supply sufficient amounts of nitrogen often makes these sources impractical. Other organic sources such as guano remain expensive and are also finite in supply (personal communication, WC03).

5.11 Consumer preferences and lack of awareness

According to a majority of participants (Table 4.14, f=15), the South African consumer does not consider ethical and environmental responsibility as important when making purchasing decisions. Furthermore, many consumers are not aware of what it actually means to be certified as organic and how this might differ from other labels (such as free-range). Participants feel that this lack of awareness creates indifference or even distrust when it comes to buying organic products. They argue that a more educated consumer base that is informed of both the technical aspects as well as the philosophy behind organic farming will help to expand the local demand for organic products. However, previous studies did find that consumers are at least aware of and care about food that is produced in an environmentally responsible way and are willing to pay more for organic food (mainly those younger and with a better income) (Engel, 2008).

5.12 Local policy environment

Another factor stifling the organic sector is the lack of local standards (until recently) (Table 16, f=6). Currently, most commercial organic farms are certified according to either EU or USDA standards (or occasionally Japanese standards). This facilitates market access to those markets, so it makes sense for those exporting their products to those countries. However, this certification is prohibitively expensive and is a barrier for entry to new farmers (Landman, 2015). See Table 4.6 for a breakdown of certification costs for participants. Having local standards that are less expensive to administer may help to grow the local sector and encourage more farmers selling on the local market to convert to organic. However, this will only be sustainable if there is a sufficient local demand for organic products.

While such a local standard was accepted by IFOAM in 2017, whether it will be supported by government (and become national policy) or see practical use, remains to be seen. Thus, should the SAOSO standards find recognition on the domestic market, it will be a vital first step to growing the market for certified organic products in South Africa (SAOSO, 2017).

5.13 The organic paradigm

One consistent narrative that emerged during interviews was the different approach that was required of participants, post-conversion, both mentally and operationally. This new orientation was explicitly mentioned (Table 4.16; f=8) when participants were asked to report the best-practices that ensured their success. The data that reflects this different paradigm can be found in the thematic diagram in Appendix C.

Perhaps this paradigm can also explain the friction, sometimes even outright mocking, that some participants experienced when interacting with conventional farmers. In effect it is simply someone within the conventional paradigm, with its demands of yield maximisation and by extension input maximisation, not being able to understand the internal logic of a paradigm that operates under different assumptions from their own.

Discursively this distinction may help to clarify the debate around organic farming and provide a clearer picture of what can and should be expected from such systems, that organic farming is a completely different system, one just as much defined by its practices as by the things it prohibits.

At its core the organic paradigm focuses not on the crop or what is being produced, but rather the ago-ecosystem surrounding the crop. The logic being that a healthy agro-ecosystem will in turn support the health of the crop. Thus, creating a balanced agro-ecosystem is an important principle of this paradigm. This starts first and foremost with the soil. Most often mentioned by participants (Table 4.16; f=8), the importance of building a healthy soil, both in terms of nutrient balance and in terms of soil biota was emphasised again and again. Strategies such as mulching, compost and compost tea additions and cover crops were all strategies employed by farmers in this study.

Another important factor is the proper understanding of and adaptation to the environment. This means understanding the properties of the soil and climate and adapting the management strategies to that system. Throughout the interviews it became clear that certain participants experienced less challenges during and after conversion due to their geographic placement and specific microclimate. For example drier and windier microclimates reduced fungus pressure (and thus the need to spray fungicides) and being isolated from other farms minimised cross contamination of pathogens and pests (personal communication, WC10). In theory, this could allow the identification of ‘ideal sites’ where organic farming may be more economically viable. In conventional farming chemical fertilizers and chemical control allow for a larger control over the effects that environmental conditions may play on a farm, in organic agriculture the options for such control are very limited, thus starting with a more favourable environment becomes paramount. This also means only growing crops and varieties that are suited to those conditions. Thus management strategies aim to align the agricultural system with the rhythms and properties of the surrounding biotic and abiotic factors of the ecosystem.

Cognitively this paradigm also requires a different approach. Because of the lengthy period of time it takes for an organic system to fully mature, a great deal of patience and perseverance is required. As discussed in Section 5.8.1, initial shocks to the agro-ecosystem during and after conversion may understandably frighten away many potential organic farmers. Those that did manage to become successful described the need for a strong belief in what they were doing, in order to persevere during the initial difficult phase. Of course this is also a factor of the extent of external support that such farmers may receive. Financial support during this time may well reduce the need for such white-knuckled endurance and financial risk-taking.

Because the focus is on supporting and understanding the agro-ecosystem, thinking about the nature of intervention also changes. Grounded in observation and understanding, organic farmers know that sometimes to intervene may well compromise the long term goal of agro-ecosystem balance. Thus a major part of this cognitive change means knowing when to simply do nothing. Pest outbreaks for example aren't always doing economically significant damage, and with the knowledge that natural enemy populations are always slightly behind the curve of pest population levels, waiting for them to respond to pest population increases may just result in the problem solving itself. Furthermore, spraying some insecticide (even an organic one) may do more damage to the natural enemy population than the pest, thereby compromising the ability for such 'background' control in the future.

Economic strategies also differ from the conventional paradigm. Farming in general is characterised by small profit margins, due to fierce competition in a free market system and the erosion of support measures for commercial farmers in the country (Hall, 2011). The conventional paradigm follows the logic that profit needs to be increased through yield maximisation, and therefore all management strategies are tailored to meet this goal. However, this often results in very high input costs, thereby shrinking the margin once more. Organic farming usually takes the opposite route. While the same yield as conventional farming can usually not be attained, the focus becomes minimising input costs. In effect profit margins may be similar, even though these strategies may look completely different. Economic viability of an organic farm should therefore not be measured by productivity (in terms of yield), but rather by efficiency (input costs versus turnover). One farmer even deliberately limited the size of his orchards in order to reduce labour costs and to ensure that they could secure markets for their total output.

The organic paradigm may also be a productive way to guide future efforts to design appropriate teaching material or curricula for agriculture students.

5.14 Conclusion

It is clear from the discussion above that participants faced many challenges to success, both at farm level and elsewhere in the food system, and this serves to support the conclusion from the literature (Chapter 2): organic farmers are in need of better support in South Africa.

One of the themes that emerged with this discussion was the impact that a lack of information on organic farming practices has on participants, especially as a challenge during the conversion process. This only serves to highlight the potential role that universities and other knowledge institutions can play in supporting farmers. Better research and dissemination of information can both be facilitated by such institutions. A more detailed explanation of possible recommendations is discussed in the next chapter.

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Chapter 6: Recommendations

6.1 Introduction

The findings of this study support the notion that little headway has been made in the last two decades in terms of the organic sector in South Africa. Many of the same challenges mentioned by studies in the early 2000's are still present today. Currently, organic farming remains an isolated and under-served sector of agriculture in South Africa.

It is clear that organic farmers experience many barriers to success in South Africa, both at farm level and beyond the farm gate. The bio-physical challenges of organic management that all new farmers face is further compounded by a lack of locally adapted knowledge, little institutional representation or support, a small domestic market and a seemingly unsympathetic consumer base. Despite all these challenges farmers still persevere. They seek out new markets, build unique brands to differentiate themselves, connect with each other for support and are willing to build success through simple trial and error.

However, despite the evidence of a few successful organic farmers, South Africa is underperforming when it comes to more sustainable methods of agriculture. Conventional agricultural systems are also contributing significantly to a plethora of environmental ills. Furthermore, with many emerging farmers in South Africa with the potential to expand their enterprises, transitioning to more environmentally friendly food production is essential and timely.

6.2 Future research opportunities

If more farmers are to be expected to make the transition to organic agriculture, better support structures need to be put in place. The first and most foundational change that is required involves the facilitation of locally adapted knowledge about production practices in order for organic management to be tailored to the South African context.

Research on organic management in South Africa needs to be conducted in collaboration with the stakeholders that the research is meant to benefit. The data collected for this study points to a significant disconnect between the agricultural faculties of universities and the participants in this study, both in terms of how little research addresses organic production systems locally and how seemingly little communication happens between participants and agricultural faculties. A larger emphasis on participatory research methodologies is needed, in order to ensure that research is tailored to the population it is serving, and to ensure that it also reaches the intended stakeholders of such research.

Further research that would add value to any future studies would be a census of all organic producers in the country. A structured, survey-based research design could be used to test the findings of this study and to see whether it is applicable to the entire population of organic farmers in the country. It is unlikely, however, that a future study would be able to overcome the hurdle of access to client information that has plagued past research efforts.

As discussed in Chapter 5, certain participants experienced less disease pressure due to favourable microclimates. Research employing GIS mapping could identify 'ideal' sites for organic agriculture based on criteria such as isolation from surrounding conventional farms, microclimates that favour lower disease incidence and proximity to natural vegetation for natural pest control. This could be used as a guide for farmers wanting to assess their own sites for suitability for conversion and could be used to identify areas were investment in organic agriculture might yield the best results.

6.3 Other interventions by knowledge institutions

A fairly simple and affordable intervention that universities can offer farmers is the creation of a hub of organic and sustainable agricultural research. Such an online platform could offer a reviewed summary of the existing literature and synthesise it in such a way as to be easily understandable to farmers and others without a scientific background. This will allow farmers to more easily access scientifically accurate information. The ARC recently launched an online platform that aims to provide such a service to the general farming sector (ARC, 2018). Again, the application could serve as a model to develop similar offerings for organic farmers.

Universities and other knowledge institutions should also engage in curriculum reform in order to incorporate more sustainable management practices into the curriculum for bachelor students and beyond. The training of graduates in organic and sustainable farming methods will better equip those entering the agricultural sector to support current farmers practicing sustainable production systems and will encourage the adoption of such practices by graduates who go on to manage their own farms.

6.4 Communities and networks of practice for knowledge exchange

One possible avenue of enhanced support to organic farmers, that may simultaneously provide an enabling environment for social cohesion and address the information needs of organic farmers, may be found through implementing the communities and networks of practice framework.

Organic farmers in South Africa share characteristics of both communities and networks of practice. They all share a similar practice, that of producing agricultural products within standards-based

frameworks (that of the EU, USDA or other organic standards). Certain farmers had closer connections with their peers and often connected and shared information as discussed above. Some farmers have even banded together and set up co-operative growers groups to strengthen their co-operation and bolster their businesses. These are all qualities of communities of practice. Other farmers, on the other hand, had little or no direct contact with other organic farmers in the country. They would often be aware of farmers within their own sector but would not have any direct contact. These farmers, together with those that had only occasional contact with other organic farmers, formed part of a larger network of practice.

This network of practice (and the communities of practice within this network) represents one of the responses by farmers in the face of little to no outside support for their practices. In the absence of formal organizational structures to support organic agriculture in the country, most participants have relied on informal networks of support that are based on mutual trust and co-operation (though as discussed in Chapter 5, not all participants shared the same goals or motivations).

What is significant about this analytical framework is that it presents tacit knowledge and informal ways of learning as legitimate aspects of knowledge exchange. Thus, bodies such as non-government organisations (NGO's) or universities that wish to work with organic farmers and play a role in improving the success of commercial and emerging farmers could approach their interventions within this framework. Oreszczyn et al., (2010) provides one suggestion on what format such interventions might take within this framework. They suggest the need for 'co-ordinators' that act as cross-boundary brokers between various communities and networks of practice. Instead of only focusing on formal systems of knowledge transfer, such organisations act as facilitators that bring actors within a network closer together, in essence moving between communities and across networks in order to connect the right groups of people with each other. Many participants reported doing this kind of work already by forming small study groups and mentoring newly established organic farmers. NGO organizations and universities can provide a lot of support by simply replicating and enhancing these already existing techniques.

6.5 The role of government

Government policy, is currently focused on a development model for emerging farmers that parallels current large-scale conventional agricultural systems and does not consider organic and other alternative farming strategies as legitimate avenues for development (Landman, 2015; UNCTAD, 2008). In order for the organic sector to grow in South Africa, a larger focus on sustainable farming systems is required from government institutions. This includes implementing policies that support the development of the sector, educating the public on the merits of this farming system, growing the domestic market for organic products and empowering existing support structures such as

government extension services to support farmers pursuing an organic production system (UNCTAD, 2008).

As mentioned above, quantifying the organic sector in South Africa remains a challenge and is considered an important gap in understanding. As previous research efforts to quantify this sector have been met with challenges that remain difficult to overcome, government can perhaps also play a role in this regard. Including questions in the next agricultural census may be the best way to quantify organic production in the country. This would allow for certified and uncertified production to be captured (and this is an important distinction to make in such a census). The number of uncertified organic producers in South Africa remains completely unquantified, as identifying such producers lies beyond the scope of most traditional sampling measures. Thus, including questions on organic production may best show what the current level and scope of organic farming is in the country, both certified and uncertified.

As mentioned in Chapter 5, a majority of participants felt that consumers were not informed enough to differentiate between organic and other ethical and environmental labelled products (such as free range). Participants also felt that consumers were not aware of the benefits that organic production systems can offer. Two South African based studies partly corroborate this, as they show that consumers have low awareness of what certification entails and as a result do not trust the claim of traceability and verification that labels of certification represent (Engel, 2008; Kisaka-Lwayo & Obi, 2014). However, both studies showed that there was at least some awareness that organic products (whether certified or not) provided some kind of health or environmental benefit. Creating more awareness of what organic agriculture entails and the various social and environmental benefits that it offers could help to expand the domestic market for organic products. This is another way that government can help foster more interest in organic production.

6.6 The role of Non-Government Organisations

According to the INR (2008) other African countries such as Kenya have received very little government support and despite this fact have managed to significantly grow their organic sectors. A major contributing factor was the extensive involvement of NGO's that trained farmers in organic methods. The UNCTAD (2008) study also backs this up.

These organisations should not be overlooked in the South African context. In the case where government institutions are not interested in supporting the organic sector, support from NGO's and the private sector may be another option, as the example above suggests. Kelly and Metelerkamp (2015) highlight this fact as well, after performing a number of case-studies in South Africa. They believe that, in the case of smallholder or emerging farmers, intensive support from NGO groups were vital to the success of these projects. Key impacts from NGO's were the ability to secure

development funding, provide technical support for production, and upskilling farmers in marketing and business related skills.

6.7 Social movements and the paradigm of organic agriculture

Perhaps the critical element missing from the previous decades is a concerted effort at social mobilisation around organic systems. The roots of organic farming lie in the social movements that sprung up after the Second World War which were motivated by a concern for human and ecosystem health (Chapter 2). These movements were underpinned by moral motivations that agriculture should not negatively impact the earth and should produce food that is safe and healthy for people to eat.

Perhaps it is time to reclaim this legacy. Organic agriculture started as a social movement and it is only through similar social mobilisation that it will garner attention from government, universities and other institutions. According to Tittonell (2014) the support from co-evolving social movements is an essential ingredient in supporting sustainable agriculture to transition to a more pervasive and sustainable system. Evidence from other developing nations, such as Brazil, Cuba and India, has shown the power of social movements to bring about fruitful change in the nature of agricultural production and the support given to them (Rosset & Martínez-Torres, 2012).

The problem with standards and certification and looking to market forces to develop the organic industry, is that it fails to capture the ideals and holism of organic farming systems, and as a result the very elements that are needed for a truly sustainable transition in agriculture (Patricia & Martin, 2000). If organic agriculture is to remain a viable alternative to an environmentally and socially destructive agricultural system, then it needs to embrace a wider discourse on the way that agricultural systems are shaped and the effects that it has on society and the natural world. The question should once again be how organic farming systems can contribute to the broader objective of sustainable food production.

As mentioned in Van der Laan et al. (2017), the commercial farming sector in South Africa still embraces highly polluting and destructive practices. In this context organic farming systems could act as a point of departure to critique the status quo of such destructive production practices and could simultaneously offer an alternative. This critique could align well with environmental justice perspectives, such as pesticide exposure of farm workers and rural inhabitants as well as the impact of climate change on the poor; these could act as further arguments to support organic agriculture. Environmental and conservation driven movements may also support organic farming systems, as they can provide an answer to some of the environmental damage caused by agriculture such as water pollution and biodiversity loss.

On an international level the understanding that organic agriculture needs to move beyond market based mechanisms is already under way. In 2017 the general assembly of IFOAM approved a strategic roadmap to evolve organic agriculture beyond the minimum standards of certification (Arbenz et al., 2017). One of the objectives of this report is to expand the options of organic verification to include PGS-systems and other peer-verified systems such as those operating within short value-chain offerings such as community supported agriculture and consumer co-operatives. The report also emphasises the need to form alliances with the broader community of movements and organizations pursuing sustainable food systems, as well as a larger focus on incorporating social justice and ethical dimensions of production (social sustainability).

Embedding organic farming systems within the wider context of sustainable and fair food systems is not only a locally beneficial objective, but will align the South African organic movement with an international impetus for organic farming systems to become a movement for positive social and environmental change.

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Appendix A: data collection instrument

Province	Number

Section 1: General information

This section includes general questions about the farmer, farm, farm products produced and labour force.

1.1 Gender			
1.2 Age			
1.3 Ethnicity			
1.5 Highest qualification/level of formal education			
1.6 For how long have you been farming organically? How long have you been farming in total?			
1.7 Size of farm (in ha)?			
1.8 What is produced on the farm? (list different products, ha under production or number of animals and tonnage or kg produced in each column)			
1.9 From the list above, please list the area that the produce is exported to (Global [list specific countries], regions, local areas) e.g. Britain, Namaqualand area, local farmers market in Greyton			
1.13 Certification company who administers the certification for the farm?			
1.14 Standards certified to?			
1.15 Annual cost of certification (In ZAR)			

Section 2 – Questions about knowledge systems

Question 2.1

In terms of sources of information, how helpful has the following sources been in terms of offering advice and information about organic farming practices? Please score each source out of five for both frequency of use (one being 'never used' and five being 'very frequently used') as well as for usefulness (one being 'has little or no information' and five being 'very important source of information')

	Frequency of use (1-5)	Usefulness (1-5)
Government	1	1
Extension services	1	1
Commercial testing/consulting	5	4
Input and or equipment representatives	3	3
Internet articles or websites	4	4
Books (both physical and e-books)	2	4
Universities/ research institutions	1	1
NGO's and other non-profit organizations/groups	1	1
Exporters/ retail chains	1	1
Certifying company	4	2
Other organic farmers	1	1
Other non-organic farmers	3	3
Social media	1	1
Other:		

2.2 Would you say there is a lack of information on organic farming practices in SA?

2.2.1 If there is indeed a lack, what area(s) do you think is most lacking? E.g. technical information, market related information, etc.?

2.3 To what extent do you talk to or are you connected to other organic farmers in the region or country?

2.3.1 How often do you communicate with them?

2.3.2 Can you make a list of all the organic farmers (certified and uncertified) that you had contact with in the last year? Please list their name (or an identifier such as “farmer1” should you not be comfortable identifying them) and the region where they are farming and whether they are certified or not.

2.4 To what extent do you talk to or are you connected to other non-organic farmers in the region or country?

2.4.1 How often do you communicate with them?

2.5 What role do you think Universities have to play in remedying this situation (if at all)?

Section 3 – Broader questions

3.1 What was some of the reasons you decided to start farming organically?

3.1.1 What would you say was the most important reason?

3.2 What was some of the most significant challenges that you experienced as an organic farmer just starting out?

3.3 How did you deal with these challenges and have you been able to solve them?

3.4 What kind of challenges do you face today?

3.5 What do you think are some of the most important practices that you use in order to ensure success as an organic farmer?

3.6 What external factors (factors outside of the farm, such as government and society) need to change in order for organic farming to be more successful in South Africa (if at all)?

Appendix B: letter for institutional permission to certifiers

APPLICATION LETTER FOR INSTITUTIONAL PERMISSION

INSTITUTION NAME & ADDRESS:

INSTITUTION CONTACT PERSON:

INSTITUTION CONTACT NUMBER:

INSTITUTION EMAIL ADDRESS:

TITLE OF RESEARCH PROJECT: Mapping the contours of organic agriculture: an exploratory study of an under-served population in South Africa

ETHICS APPLICATION REFERENCE NUMBER: SU-HSD-004228

RESEARCHER: Pienaar du Plessis

DEPT NAME: Department of Conservation Ecology and Entomology, Stellenbosch University

CONTACT NUMBER: (+27)832638412

EMAIL ADDRESS: pienaardpl@gmail.com

To whom it may concern

Kindly note that I am an MSc student at the Department of Conservation Ecology and Entomology at Stellenbosch University, and I would appreciate your assistance with one facet of my research project.

Please take some time to read the information presented in the following four points, which will explain the purpose of this letter as well as the purpose of my research project, and then feel free to contact me if you require any additional information. This research study has been approved by the Research Ethics Committee (REC) at Stellenbosch University and will be conducted according to accepted and applicable national and international ethical guidelines and principles.

1. **A short introduction to the project:**

Organic agriculture in South Africa currently faces two major problems:

There is very little to no institutional support specifically for organic production, both in government as well as other institutions such as Universities. This includes an unfavourable policy environment (such as a lack of national standards), no training material adapted to South African conditions and a lack of research on organic agriculture at Universities.

A lack of baseline data about organic production in South Africa further exacerbates the first problem. There are no organisations (including Government) that collect information of organic agriculture in South Africa. Thus, there remains uncertainty about the types of production happening in the country as well as the amount and distribution of these producers.

2. **The purpose of the project:**

The purpose of this study is to gather basic information on the amount and type of farmers certified as organic in South Africa, as no such information currently exists. The study also aims to determine some of the main challenges faced by these producers and to explore ways that these producers can better be supported by other organizations and institutions such as extension services and universities.

3. **Your assistance would be appreciated in the following regard:**

I would like to formally request permission to access the name and contact details of all your clients currently certified as organic (based on any standard) for production within South Africa. Neither the government of South Africa, nor any other organisation at the time of writing keeps records of the amount of certified farmers in the country. Thus, the only way for this study to access such information is through the certifying bodies. As mentioned above, we wish to contact certified farmers for interviews, in order to do so we require a list of clients that includes the name of the client, an email address and a telephone number (if possible).

4. **Confidentiality:**

All client lists obtained in this way will be kept securely and will not be shared with any individual or organisation. Only the principal investigator will have access to these lists. Furthermore, to protect certifiers, they will not be identified in the reporting of the study, or linked to any identifiers. Clients

obtained through certifiers will also not be linked with any identifiable information during reporting of results or any other form of public reporting (such as publishing in a scientific journal)

Thus, both certifiers and clients can be assured of confidentiality and anonymity.

If you have any further questions or concerns about the research, please feel free to contact me via email (pienaardpl@gmail.com) or telephonically (+27 832638412). Alternatively, feel free to contact my supervisor, Rhoda Malgas, via email (rmalgas@sun.ac.za) or telephonically (+27 826722750).

Thank you in advance for your assistance in this regard.

Kind regards,

Pienaar du Plessis

Principal Investigator

Appendix C: Thematic diagram of the organic paradigm